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2 DoD renews its emphasis on training and education

An interview with Lt. Gen. Edgar A. Chavarrie, USAF

As the Department of Defense has added increasingly more sophisticated weapon systems to its inventory, interest in education, training, and training technology has surged. In this wide-ranging interview, Lt. Gen. Chavarrie, the Deputy Assistant Secretary of Defense (Military Personnel and Force Management), expounds on the various training initiatives currently under way in DoD. Among his principal conclusions is that a spirit of cooperation is essential if traditional barriers such as interservice rivalries are to be overcome.

8 Centralizing the management of defense training data

G. Thomas Sicilla

DoD and the services have long recognized the importance of training-related data. Yet the decentralized nature of training has impeded the effective use of this information. The mission of the newly created Defense Training Data and Analysis Center is to systematically gather, integrate, maintain, and disseminate such data and thereby support efforts to strengthen training throughout DoD. This article chronicles TDAC's establishment and outlines its primary functions, organizational structure, and working relationships.

12 Joint-service efforts boost training technology

*Robert A. Wisner
and
G. Gary Boycan*

The Joint Service Research and Development Program is adding a touch of futurism to military training by using computer-based instructional devices to augment such traditional training modes as classroom lectures, training manuals, and hands-on drills. This article chronicles the program's evolution and describes three of its emerging projects—the personal aid for electronic maintenance, a computerized handheld instructional prototype, and a clearinghouse for computer-based instructional programs and program formats.

16 The manpower and training initiatives of the National Security Industrial Association

Wolf J. Hebenstreit

The most recent addition to the National Security Industrial Association's roster of standing committees is a group responsible for manpower and training issues. The new committee reflects the defense community's recognition that personnel and training factors are growing in significance as determinants of readiness. In this article, the chairman of the new committee outlines the specific concerns of each of the group's five permanent subcommittees and describes related initiatives NSIA has instituted to address major issues in this area.

18 Two options for revamping Survivor Benefit Plan offsets

William C. Letzkus
and
Charles R. Margenthaler

The Survivor Benefit Plan offers military retirees an opportunity to provide an annuity to designated survivors. Due in part to the effects of current SBP offset provisions, however, participation has not reached levels anticipated when Congress established the plan in 1972. Those provisions, based on the Social Security benefits formula, essentially ignore nonmilitary wages and result in very high offsets to the annuities. Here, the authors propose two alternate methods of computation and argue that either would yield more equitable offset amounts.

25 The Airlift Master Plan: evolution and implementation

Colonel Thomas D. Pilsch, USAF

Airlift is vital to the nation's rapid deployment capability and the credibility of our conventional deterrence posture. The Airlift Master Plan, drawn up by the Air Force in 1983 and approved later that year, sets forth airlift capability goals and the strategy for meeting those goals into the twenty-first century. Reduced to its essentials, the plan is C-5 now and C-17 later. In this article, the author chronicles the events and factors that shaped the plan and reports on the status of implementation.

32 Contract administration in DoD: "Out of sight, out of mind?"

Robert E. Barnes

Defense contract administration activities often take place without much fanfare. But these support services are vital to the acquisition process and can have enormous impact on the efficiency and effectiveness of procurements. In this article, the author surveys the numerous activities that comprise contract administration in DoD and explains the relationship between them and other acquisition functions. He also highlights some of the benefits available from and savings attributable to the efforts of contract administration personnel.

39 Departments

Federal personnel manager: DMJ legal columnist Stephen A. Klatsky offers practical advice about taking disciplinary action. **Report synopsis:** the Congressional Budget Office examines federal job misclassification. **News summary:** DoD establishes a task force on equity for women, the strength of the Selected Reserve exceeds one million for the first time since 1961, OPM outlines a plan to reduce the number of mid-level federal personnel, Grumman unveils the X-29 aircraft and its revolutionary forward-swept wing, and more.

DoD renews its emphasis on training and education

AN INTERVIEW WITH LT. GEN. EDGAR A. CHAVARRIE, USAF

Training and education are taking their place at the forefront of the push to optimize the effectiveness of our military personnel and their new weapon systems.

Lt. Gen. Edgar A. Chavarrie is the Deputy Assistant Secretary of Defense (Military Personnel and Force Management). A bombardier-navigator in both World War Two and the Korean War, he has served on the staffs of various organizations, including the Supreme Headquarters Allied Powers Europe, the Deputy Chief of Staff for Plans and Operations, the Joint Chiefs of Staff, and the Headquarters United States European Command. Lt. Gen. Chavarrie holds a bachelor's degree in international relations from the University of Southern California and a master's degree in economics from George Washington University.

At a National Security Industrial Association conference last May, you noted that the defense secretariat has expressed increased interest in training. What do you attribute this surge of interest to?

I think there's a renewed recognition that our readiness crucially depends on our people having a high degree of job proficiency. Emphasizing training goes hand in hand with the introduction of so many sophisticated new weapon systems. Sophisticated weaponry doesn't mean much if we don't have well-trained people who can maximize its effectiveness. I think, too, that part of the push is due to the Defense Science Board's 1982

lack of a focal point for training data collection. It's tough to solve major training problems when you're dealing with a large number of unconnected data sources.

Is this why you've created the Defense Training Data and Analysis Center?

Yes, that's one of our most recent initiatives. TDAC was created to collect and analyze all kinds of training data and then disseminate it to the training community, in and out of DoD, depending on need. Over the long term, TDAC will fill our major information voids. But that's only one of several initiatives we're taking.

What are some of the others?

One involves a number of demonstration projects being conducted under the joint-service manpower and training R&D program. These initiatives will help us test and evaluate today's most promising technologies and approaches. We're hopeful they will make it easier for us to map out the best way to go in the future. We've also been involved in helping to create one new committee—the OSD Steering Committee on Training and Training Technology—and have been strongly supporting the creation of the National Security Industrial Association's manpower and training committee. The OSD steering committee will help direct how we use the



So far, so good. With the approval of Secretary Weinberger, the committee was formed in the spring of 1983 in response to a Defense Science Board recommendation that OSD establish a DoD-wide proponent for training. In fact, the steering committee served as the proponent in establishing TDAC.

You also mentioned a National Security Industrial Association committee. Could you provide a few details about NSIA's role?

I understand NSIA has several initiatives under way. The first, mentioned above, is creation of a manpower and training committee, which is intended to bring together the industry and government players who currently develop the technologies and build the systems that train our personnel. This is a very welcome and significant step. These people will address training requirements, policies and plans, and concepts. Second, NSIA cosponsors, along with DoD and the American Defense Preparedness Association, an annual training equipment conference, which is the largest conference in the country on simulators and their many applications. Third, NSIA hosts an annual manpower, training, and human engineering conference, which focuses on the value of training, overall systems effectiveness, and manpower research related to performance. We believe the importance of these conferences will continue to grow, keeping pace with the increased emphasis on the various training technologies. Fourth, they also publish the *Training Technology Journal*, which is the only non-profit journal specializing in training system requirements, research, and development.

Are there many corporations currently conducting independent research and development in the area of training?

If you take into account things like simulators, for example, I guess many major companies are involved in some way.

So while the effect may be imperceptible at present, corporations are thinking about upfront training?

I believe so, and there's really a psychological kind of fallout that I think will come from this. You get an R&D fellow and a contractor together and they're talking hardware. Somebody says, how about the student

Exactly. So, now, somewhere in the acquisition equation you have a hardware person, you have an R&D person, you have a contractor, you have a logistician. Where's the trainer, where's the personnel expert, where's the human factors rep? I think they've been there, but haven't been emphasized enough. We're going to try to add that proper emphasis on manpower, personnel, and training factors.

Are these initiatives part of a master plan to put some new teeth in DoD's policies? Are they enough to ensure that training gets adequate attention in the preliminary stages of the DSARC cycle?

I would put it another way. To emphasize training, you've got to bring together agencies and organizations that are interested in it so they can start talking about it. To put teeth into something, you've got to set up an institutional mechanism. That's what is being done with TDAC, the OSD steering committee, the NSIA training committee, and the services' TDAC program review committee. A lot of folks are interested in training and training technology, but they're typically going off in their own directions. So first, we want to institutionalize this increased interest, and second, we want to start asking substantive questions. We're embarking on that second step now. We want to know what the services want to do with TDAC. What is TDAC going to do in order to react to the services? What do the policymakers—the steering committee and the services' TDAC program review committee—want TDAC to do? I hope I can serve as a catalyst for a service-OSD-industry interface on some of the matters with which we will be dealing.

When will you have some answers to these questions? What will TDAC's gestation period be?

That's a good question. We just don't have the luxury of moving slowly anymore. The services' program review committee asked much the same question: when do you see this thing jelling? I told them that if we can't provide some pretty good answers a year or two from now—which is not to say that everything's going to be working 100 percent the way we want—then we'll have a look. I've never been more confident of anything than I am that this is the beginning of a success story.

So the services shouldn't wonder why are we wasting

Congress sees that and says, look, there's got to be a better way. You, Mr. Secretary of Defense, have to oversee that. Now how do you do it? Cooperation, with a capital "C." If we can cooperate at 80 percent we'll be ahead.

Do you think 80 percent is enough? The services have historically had an attitude of "If it wasn't built here, we don't want it." How do you get around that problem?

I think it's always been that way, and maybe always will be, because the services have unique requirements, unique problems, unique training for their people. It's natural to want to do things your own way, whether it's procuring airplanes, training people, buying food, or paying reenlistment bonuses. All of these actions have their own little constituency. So what we have to do is work within this real-world context. Anytime you're working on a 100 percent scale, there's always 75-80 percent of the things that you can coalesce on. If you make a 5 percent inroads on the other 20, you're O.K. You're never going to do it all.

But you don't need to worry about that last 20 percent nearly as much as the first 80?

I think that's probably the best way of putting it. I don't worry too much about it. Like the marginal-analysis people in economics say, if it takes as much effort to solve the last 10 percent of a problem as it does to solve the first 90, then there had better be another look at the need for handling that last 10 percent.

The fact that the services see it's got the secretary of defense's attention may allay their fear that it's going to take away their turf?

I think we're all in this together. If the Congress is interested, then it's *our* business. There are pockets of resistance, but most of the service people I deal with are pretty responsive to this cooperative spirit.

So what's the lesson? That you can only get 75 percent of a loaf on your own? That you need help if you want to get that other 25 percent?

It's this. When it comes time to get money, three or four heads are better than one. If the secretary of defense writes a letter to the Congress and says, this is what we need for the defense of our nation, that's a lit-

tle. And a separate entity and not pay attention to material service needs. We're not going to do that. This is 1984 and that kind of mentality should be gone from this building.

But that kind of mentality exists outside of the building? Are the services still fearful . . .

Oh I think there will always be some fear, and I'll tell you why. Years ago there was an economy push on. Some quarters were saying that we couldn't afford increases in flying hours anymore and that we should just let pilots fly simulators. Well, there's a point at which you can fly simulators and enhance proficiency, and there's a point at which you have to go up and fly. Anyway, for a while flying hours were cut in order to save money and there was increased emphasis on simulators. Well, many of us remember those times, and institutions remember. We must keep the proper perspective on simulators and flying hours.

How many defense organizations are presently collecting training and training technology data?

To an extent, all defense organizations probably collect training data in some form. The trick is to do something with it which is useful, practical, and relevant.

Do you envision TDAC putting any of those organizations out of business? Maybe not as collection agencies, but as storage agencies?

One of the first orders of business for TDAC is to tap into these sources. We really don't know for sure who or where all of them are. In both the private and public sectors, I believe, large organizations sometimes gather information for information's sake. This is an information era, and I suppose everybody, including the janitor, collects it.

You noted earlier that TDAC, over the long term, is going to help fill the major information voids that have been hampering efforts to improve training effectiveness. Can you tell us more about these voids and just how major they are?

I think TDAC is going to be a catalyst. It will allow us to focus on where the deficiencies are, where the data is good, bad, or indifferent, and where the analysis might be done in a different yet useful way. In cooperation with the services, TDAC will take data and analyze

has a charter to build a data base to help the services answer questions about that process. Another area that can be improved is keeping book on things that have worked in the past and those that haven't. We've been accused many times of reinventing the wheel. We want to have data available so the services can take a look at what has worked in solving training problems so we can avoid mistakes. These kinds of training voids represent some of the issues TDAC will address.

Do you see TDAC's handling of data differing in any way from that of the services?

It would be difficult for me to make a judgment on the kind of analysis that each of the services does. But I certainly don't foresee the time when TDAC is doing something way off the wall, while the services are doing something else. To guard against that, we have the program review committee, which is composed of training people from all the services; they'll decide TDAC's initial priorities and general work program. We don't want the center doing analysis for analysis' sake.

Do you believe that there should be some sort of formal link between TDAC and the various offices in DoD that are currently letting out contract monies for training research? Say, for example, that Rand is conducting research at the behest of MI&L on a training-related topic. Do you envision a formal conduit so that their research will automatically go to TDAC?

In such an instance, I would expect a lot of cooperation between TDAC and Rand. Absolutely. The steering committee will have working groups that should ensure it. I really don't see that as a problem.

We hear lots of talk about cost-effective training. How practical is it to define training as cost-effective in a time of peace?

It's awfully hard to say, in effect, here's the amount of money that we put in and here's the amount of training we get out. Theoretically you always want to do better with the same amount of money; that's what makes training cost-effective. But in the final analysis, it's readiness that counts.

Is there enough money for hands-on training and simulators today?

the final analysis the output is only measurable if you must go to war and win. That's just the nature of things. So I would say our real emphasis is on doing things better. When we see a deficiency somewhere, that's the proper time to ask for more resources.

Do you see any overlap in the functions of TDAC and the Defense Manpower Data Center?

No, but I see a lot of exchange of information, a lot of interface between the two. DMDC is truly a data base—in fact, they have the best data base in the world. Everybody's using them. I expect some day TDAC will be its equivalent in the training world.

What do you think the training environment in DoD will be like by the year 2000? Where are we going?

That's a really good question. It has no answers, but there are a lot of factors bearing on the problem. Expensive hardware is one of them. But people are more expensive now, too. Consider what it takes to train an F-16 pilot today compared to what it cost them to train me, for example. It's upwards of a million bucks to train an F-16 pilot. I can assure you it didn't cost that much for me! We're also getting very high retention rates in our career force. That trend has its own ramifications. These people are going to get promoted because they stay longer, there will be greater numbers of families, etc. So we're going to have to worry about retirement pay, about family care centers, about everything that goes with quality of life. Another variable in the equation is the fiscal reality that we're going to be faced with in the United States, and not just in defense. In addition, we don't know where technology will be by the year 2000. It could be that some real breakthrough will take place in training devices. Even so, fiscal reality can't be ignored. The demand on the defense dollar will grow, so we have to keep down the costs and still train our folks effectively at the same time.

I suppose that in one sense you'll be holding down training costs through the higher quality of recruits and the greater retention rate?

That's right. That's efficiency. But we also have to remember that, by nature, the force is getting expensive. They're getting older, staying longer, needing more things. We've got to be fair and competitive with

on Training & Training Technology

In 1982 the Defense Science Board's summer study on training and training technology concluded that the Department of Defense lacked a high-level proponent for training technology. In response, the secretary of defense established the OSD Steering Committee for Training and Training Technology. The committee's mission was to effectively exploit training technology on a DOD-wide basis by establishing a relevant information exchange among the services and appropriate defense agencies.

More specifically, the steering committee was directed to:

- Apply technological innovations through which performance in training functions could be improved or resources saved.

- Recommend ways in which research, development, and acquisition of advanced technology could appreciably enhance training effectiveness in all of the services.

- Advocate and monitor implementation of the Defense Science Board's recommendations.

- Determine the feasibility of developing a center for training data and analysis.

The steering committee comprises senior staff members from the offices of the under secretary for research and engineering, the assistant secretaries for comptroller, reserve affairs, and manpower, installations and logistics, the director of program analysis and evaluation, and the chairman of the Joint Chiefs of Staff. Acting at the committee's behest are working groups, which consist of staff members from the above offices as well as each of the services, and standing or ad hoc action groups tasked with studying, analyzing, and solving specific problems.

fense. Its recommendations are implemented through the normal planning, programming, and budgeting system process.

Of special interest to the steering committee is the identification of training functions which are particularly resource-intensive. When technology already exists that can save money, space, material, or time, the committee recommends its rapid procurement and wide use. When improved technology is required but unavailable, the committee serves as a research and development advocate. In either case, the committee strives to assure that DoD is able to exploit the state of the art in training technology and thereby improve the effectiveness and efficiency of training.

Illustrative of the kind of tasks undertaken to achieve this far-ranging goal are the following:

- Development of meaningful performance measures and improvement of evaluation methods.

- Evaluation of the flow of information on training technology among the services and DoD.

- Monitoring of the material acquisition process to ensure that training considerations are given their due.

- Examination of the mechanisms designed to provide maximum interoperability of training technology among the services.

- Review of the services' acquisition programs relevant to training technology in order to assure maximal joint-service use.

Testifying to the commitment of the OSD steering committee to improved training is the recent creation of the Defense Training Data and Analysis Center, located in Orlando, Florida. The steering committee was an advocate for the center and guided the development of its functional description, organizational make-up, and staffing. For a closer look at the center and its operations, see the article on p. 8.

all-volunteer environment and there are a lot of things that come with that. The alternative—a draft—is not in the cards and doesn't make sense, except in the event of a major mobilization. We don't need a draft.

Maybe the price seems a little worse because we've not tried this approach in the past.

That's right. We've had the all-volunteer concept for about 10 years, and in the first few, there were some difficulties. I think we were in post-Vietnam times. But

military are high school graduates. The average in the American population for that age group is 75 percent. The scores of these people on the entrance aptitude test place them about 15 percent higher than the average in the overall youth population. They're smart people. The bottom line is that we're going to renew emphasis on training and education. There are enough people worrying about hardware and pay and commissaries and PXs and all of that. We have to emphasize training and education because it hasn't gotten the attention it needs



Centralizing the management of defense training data

By G. THOMAS SICILIA

The Defense Training Data and Analysis Center, a new organization set up to collect, integrate, and analyze training-related information, promises to be a major asset in the effort to improve training in DoD.

A major recommendation of the 1982 Defense Science Board's Summer Study on Training and Training Technology called for the DoD establishment of a centralized data collection and analysis center for the defense training community. The board reported that while good training-related information appeared to exist, it was not readily available and was not always in a form best-suited to the needs of training managers. The board found that the decentralized nature of training and the lack of a data collection point had led to a large number of widely dispersed data sources, making it difficult to focus resources on large, broadly based training management issues.

Recognizing the need to solve these problems, the secretary of defense directed the establishment of the Defense Training Data and Analysis Center. This new organization began operating on August 1, 1984, and is programmed to have a staff of about 65 military and civilian personnel by the end of FY 1985. Located in Orlando, Florida, it will eventually be collocated there with the Naval Training Equipment Center and the U.S. Army Program Manager for Training Devices when a new facility is ready in 1987.

The new agency serves as DoD's central repository for training data and information on training management concerns ranging from the effectiveness of various instructional methods to the cost of maintaining selected

the efficiency and effectiveness of current and future training.

Organizationally, the center receives overall policy and program direction from the office of the secretary of defense, with input from the military services provided through a joint-service program review committee. The director of TDAC reports directly to the deputy assistant secretary of defense (military personnel and force management) and works closely with the director of training policy. As executive agent, the Navy furnishes administrative and organizational support.

To carry out its mission, the center stores data it extracts from existing operational data bases and integrates the data to create hybrid data bases for analytical purposes. For example, a typical TDAC data base could be longitudinal and historical files that track the training history of individuals throughout their military careers, or the inventory, cost, and application of training devices and subsystems throughout the life cycles of major systems. Such data bases will enable managers, policy-makers, and members of the research and development community to apply quantifiable training data and analyses in a wide range of management and policy actions.

Specific technical objectives as stated in the center's charter are to:

- Provide training data and analytical support for use in the system acquisition process.

measurement systems and the information they provide to improve training effectiveness.

- Acquire data and develop methods that assess and predict the training cost and effectiveness of alternative methods for improving training value.

- Improve communication and promote training technology transfer between and among the services, industry, and international activities.

As is clear from these objectives, the basic product of the Defense Training Data and Analysis Center is information needed for operations and decision making. This will be in the form of data analysis, data descriptions, and statistical reports for DoD, the services, congressional and other oversight committees, and the general public. Principal beneficiaries of this information will be the manpower, logistics, and training communities within both the Defense Department and the individual services. The charter also calls for the center to work with industry, academia, and other interested groups, as appropriate. The center honors requests not only from the office of the secretary of defense and the individual services, but from outside activities as well. Outside requests are handled in coordination with the appropriate service or with the principal policy office within the office of the secretary.

The center is organized into six operating divisions which have the following functions and responsibilities.

Individual training division. This division collects, consolidates, stores, and disseminates information on military individual training. Refresher and on-the-job training which supplements or substitutes for such courses also falls within its purview. Data gathered relate to the principal areas of individual training such as the success of schools in providing recruit, primary

managers compare alternative training methods for similar military occupations. Assessment of pertinent civilian work force data bases is another responsibility of these analysts.

Collective and joint training division. Collective training encompasses the training of groups ranging from squads to combined commands, and joint training involving two or more services. In cooperation with the service operational commands, research organizations, and the center's other divisions, this division assembles, maintains, and disseminates data needed to improve the quality of collective training methods and strategies. This division plays the center's lead role in the areas of training readiness data, measurement systems, and the maintenance of an effective interface between training, military exercises, and training data associated with these exercises.

In addition, the division performs cost-effectiveness studies of alternative training strategies, including the application of new collective training technologies. Of particular interest to the division are methods for supplementing or complementing collective and joint training currently constrained by air and ground space limitations, lack of realism, and exceptionally high cost.

Simulation and training systems division. The focus of data collection and analysis activities within this division is on the performance of training systems, whether already fielded or in the process of being acquired. The staff collects, stores, and distributes data and analytical methods; this information will be used in evaluating the performance of training systems. The division's data base eventually will include information on training requirements, analyses used to define system design, simulator design and engineering characteris-

The goal of the Defense Training Data and Analysis Center is clear-cut and well-defined—to provide all members of the DoD training community with data and analyses that are responsive to their unique missions.

skill, and skill-progression training; costs and procedures associated with developing, implementing, and revising courseware; and training loads, course length, and resources needed to support individual training programs.

tics, simulation fidelity, cost trade-offs, transfer of training, and other subjects relevant to establishing system performance baselines.

This information will benefit managers responsible for training systems acquisition and will be designed as

The Defense Science Board found that the decentralized nature of training and the lack of a data collection point had led to a large number of widely dispersed data sources, making it difficult to focus resources on large, broadly based training management issues.

matters related to instructional technology and maintenance training for both civilian and military personnel, as applicable to new and fielded systems.

Reserve integration division. Exclusively devoted to the collection and analysis of data related to reserve forces training, this division assists DoD managers in addressing the often unique problems associated with the reserves, such as weekend and summer refresher training. The data collected by this division will help managers address issues such as the adequacy and effectiveness of training equipment and facilities used by the reserves; it will also help them track data on individual and unit performance.

Of special concern to the division are the transition and transfer of training technology, devices, and courseware from the active to the reserve forces. Its activities include review and identification of training materials being used by the active forces to determine their adaptability to the reserve training environment. Issues affecting surge training, especially for land combat forces, and the capacity of the mobilization training base also figure prominently in the division's data management efforts. In areas affecting both reserve and active forces, it works with and through the center's other cognizant divisions.

Training effectiveness division. Personnel in this division track the development and validation of job performance measurement methods; they also collect and analyze civilian and military performance data, develop training-effectiveness measures, and conduct training-effectiveness analyses. Working with the individual services, the division serves as DoD advocate for collecting and storing individual, collective performance, and civilian work force data. Wherever possible, it takes advantage of opportunities for linked data files and gathers information that facilitates cohort analyses.

division that the center's data bases are linked to each other and to relevant external data bases such as those maintained by the Defense Manpower Data Center. Data integration enables managers to quantify and analytically address the training-related aspects of broader defense issues. It also allows the training community to address those same issues as they affect training-related analyses, decisions, and policy formulation.

As its name suggests, in addition to integrating information collected by the center's five other divisions, this group performs analyses that cut across division boundaries. One of its major projects, for instance, is helping the simulation and training devices division link its system-related training information with performance data pertaining to fielded systems. Also, this division is the organizational element that most closely works with industry and others to promote technology transfer between the private sector and DoD.

While its charter is broad, the goal of the Defense Training Data and Analysis Center is clear-cut and well-defined—to provide all members of the DoD training community with data and analyses that are responsive to their unique missions and roles. The information furnished must be credible and useful, and collection and storage methods must be flexible in order to promote maximum interaction between data bases. These features are essential if the center is to succeed in improving the overall efficiency and effectiveness of defense training programs. **DMJ**

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Joint-service efforts boost training technology

By ROBERT A. WISHER
and
G. GARY BOYCAN

Interactive instructional devices are adding a new dimension to military job training and reaffirming DoD's position at the head of the class in educational technology.

Just as it adds to the sophistication and capability of weapon systems, so too does technology enhance the efficiency and effectiveness of military job training and personnel management. Under the Joint Service Research and Development Program, for example, the Defense Department is applying technological advances, especially those in video display and voice simulation, to manpower, personnel, and training problems common to the services.

This relatively young cooperative effort is the outgrowth of a 1978 House Armed Services Committee request that the services increase their coordination on research and development relating to manpower, personnel, and training issues. In its 1980 research and development report, the committee reemphasized its desire for DoD-wide sponsorship of such projects and cited areas particularly appropriate for joint funding. Among them were training technology, microprocessor-based job-performance aids, and automated testing procedures.

Responding to these requests, the Navy nominated a program element which emphasized manpower and personnel issues; in fiscal year 1982, the service allocated \$5 million to fund five such projects and later added \$2 million in continuation funding. In FY 84, the Army followed suit and set aside \$6 million for additional projects which focused on training and technology. Congress, in the FY 83 appropriations bill, declared the

villian representatives from the four services, the subcommittee annually reviews about 20 proposals for joint-service funding submitted by the service's manpower, personnel, and training laboratories. It assesses each proposal's technical merits, its potential for near-term payoffs, and its cross-service applicability. On average, the subcommittee recommends four or five proposals for funding each year. The projects selected are not "new starts" but rather the culmination of ongoing laboratory research that is expected to evolve into demonstrable prototypes within three years. The projected per-copy price of devices targeted for development ranges from \$200 to more than \$20,000.

At the high end of this price spectrum is the personal electronic aid for maintenance. Commonly referred to as PEAM, this portable, automated maintenance information system is designed to increase the productivity of organizational-level maintenance technicians. The Army and Navy are scheduled to take delivery of four PEAM prototypes, for experimental use, by the end of fiscal year 1985. Although the decision is not yet final, the Army has tentative plans to conduct its experiment on the M1 tank, while the Navy will test it on either the Sea Sparrow or a new power generator.

The increasing complexity of new military equipment underscores the need for a portable, electronic maintenance aid. A case in point is the simple growth in number of pages of technical documentation required to op-

checks of other components to ensure that they are working properly.

- A man-machine interface module, hand-held or easily mounted, is connected to the main unit by 12-foot cables; it consists of a thin-film electroluminescent display screen, command keys, and a speaker for simulated voice interaction with the technician.

- A subject-specific mass memory cartridge can store about 175,000 words and 300 graphics.

- Two power cords can link the main unit to a variety of power sources, including a portable battery pack.

- A headset with microphone provides voice interaction with the display screen.

Typically, a technician will obtain the PEAM device from his or her supervisor and carry it to the maintenance site. After connecting the main unit to a power source and performing standard start-up procedures, the technician begins the maintenance task by following instructions that are video-displayed and, if desired, voice-synthesized as well. To activate the voice synthesis feature, the technician vocalizes the eight functions that the module can perform, thereby enrolling these commands into the module's memory. When the technician revocalizes the command, the module performs the requested functions just as if the appropriate command keys had been pressed. This advanced voice technology is especially useful in that it frees the individual from thumbing through technical documents and allows him or her to keep hands and eyes on the maintenance task. The technician can, for example, command the device to provide more detail, to back up, or to continue with a particular procedure.

The services will complete testing of the PEAM in FY 86, by which time they will be in a good position to assess the device's field effectiveness. Certainly, the PEAM represents a step forward in an area which has considerable room for improvement. One study of tracked- and wheeled-vehicle maintenance at several Army installations, including Ft. Hood, Texas, and Ft. Knox, Kentucky, found that mechanics completed only 57 percent of all attempted maintenance tasks correctly and only 33 percent of all final checks correctly.² Related research has focused on the use of paper-based job

The PEAM promises to be particularly valuable in maintaining equipment and systems that have voluminous maintenance-related documentation requiring frequent updating. The device's semiconductor-based mass memory makes it possible to program changes into the memory in minutes. Of course, cost effectiveness will be a crucial consideration as well and will be determined after the services complete testing.

Another training aid being developed under the joint-service program is the computerized hand-held instructional prototype, or CHIP. It is an updated version of the Army Research Institute's TUTOR, developed in 1982, and incorporates recent miniaturization advances in semiconductor technology. The Army at Fort Polk, Louisiana, and the New Hampshire Army National Guard are now testing 20 CHIP prototypes.

The device extends the benefits of computer-based instruction, such as self-pacing, drill-and-practice exercises, and controlled feedback, to a variety of nontraditional training environments. Such settings include motor pools, mess halls, and other places where people must wait or otherwise while away time. The CHIP enables an individual to convert idle minutes into learning time, a distinct advantage in light of research which has shown that the amount of time spent learning is the strongest predictor of training efficacy.⁴

The housing for the device is a lightweight plastic case, 11 inches long, 9 inches wide, and 2 inches deep, on which an open-faced, wire-ringed instruction and test booklet can rest securely. Just above the positioned booklet is a multifunction display screen with capacity for 29 characters; just below it is a keyboard containing 15 general-purpose keys and three special command keys. The hand-carried instructional aid has a built-in speaker for synthesized speech and an earphone jack. On the back are the receptacle for the program cartridge, the on-off and volume control switch, and a connection for recharging the internal nickel-cadmium batteries.

The CHIP uses digitized speech, liquid-crystal display, and paper-based text and line drawings to pose specific questions and vocally inform the respondent if an answer is correct. Because it features interactive audio and video capabilities, this computer-based training device holds particular appeal for members of the video-arcade generation.

¹C. Sylla and A. Babu, *Computer-aided Layout of Procedure Information for Training and Job Aiding* (Orlando, FL: Training Analysis and Evaluation Group, December 1983), technical note 11-83.

²R. Kern and J. Hayes, *Research Findings to Aid Supervisors in Improving Maintenance Performance* (Alexandria,

³Troy V. Caver, "New Maintenance Manuals Help to Reduce Life-Cycle Costs," *Defense Management Journal*, September 1978, pp. 26-31.

sociated with operating and maintaining a network. The format consisted of a pretest, explanations of the functions of the parts and tools covered in the exercise, and a game in which the student, responding to voice-synthesized cues, had to correctly identify the illustration of a piece of equipment. Tests of the device's effectiveness revealed a 30-percent improvement in short-term memorization after several hours of instruction distributed over a two-week period.

This computerized hand-held prototype has many other prospective instructional applications as well, including job-related mathematics, foreign languages, and task-related procedures. Project personnel are developing program cartridges for these applications, and three additional CHIP data bases should be ready in FY 85. A comprehensive cost-effectiveness study will follow in FY 86. Preliminary estimates for large-quantity purchases indicate a unit price of about \$200.

Also evolving under the Joint Service Research and Development Program is TRIADS. It represents an ambitious project to aggregate service-sponsored, computer-based instructional efforts that are potentially applicable to the training requirements of one or more of the other services. TRIADS features a library of computer-based instructional programs and program formats that one service has developed and that another can apply or adapt to satisfy related training needs. The library contains only those programs and formats that have cross-service application. A working group comprising representatives of each of the service training laboratories meets twice a year to identify candidates that should be considered for inclusion in the library.

Trends in instructional technology point to the need for TRIADS. For example, many of the numerous computer systems being purchased by service training activities are compatible with only certain software designs. Also, incompatibility results in an inability of in-place systems to readily absorb advances in training technology that are emerging from the service laboratories. Finally, many computer-based instructional programs now in use are not user-friendly, a drawback recognized by the 1982 Defense Science Board. That group recommended that DoD develop or adopt user-friendly software that employs a common language such as Ada® (see John D. Fernandez and Sallie Sheppard, "Issues Affecting Ada® Software Conversion," *Defense Management Journal*, Third Quarter 1984, pp. 16-21). The purpose of TRIADS is to help stem incompatibility problems and to ensure that instructional programs adequately address user requirements.

The Semantic Network, developed by the Navy Personnel Research and Development Center, is one tool that TRIADS makes available. It enables subject matter experts to design an instructional program modeled after the way scientists believe information is organized in the human memory. Such a program features a volley of questions and answers between the student and the device and helps the student memorize and recall interrelated information. The network in effect navigates through a data base, extracting facts and units of data that it conveys to the student through games similar to Twenty Questions, Flash Card, and Jeopardy. The Navy is currently using the Semantic Network to familiarize officers with the characteristics of ships and the capabilities of shipboard systems and weaponry. The Navy Fleet Combat Training Center, Pacific, is also applying it to electronic warfare training.

Through projects such as TRIADS, the Joint Service Research and Development Program is taking major strides toward more broadly based and more cost-effective application of computer-based instructional technology in DoD. The program is a recognized catalyst for cross-service and cross-agency cooperation in the training technology arena. Such cooperation facilitates technology transfer among the services and enables DoD to support the training technology efforts of industry, other federal agencies, and members of the North Atlantic Treaty Organization.

Certainly, the growing complexity of military equipment, coupled with the need to make full use of the pool of available manpower to operate and maintain that equipment, highlights the importance of this joint-service effort to foster effective, accessible, technologically advanced training devices. **DMJ**

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and training initiatives of the National Security Industrial Association

By WOLF J. HEBENSTREIT

Under NSIA auspices, industry and government professionals are seeking answers to key questions affecting the soldier-system interface.

The most recent addition to the National Security Industrial Association's roster of regular committees is a group responsible for manpower and training issues. The new committee reflects the defense community's recognition that personnel and training factors are growing in significance as determinants of readiness. Under NSIA auspices, industry and government professionals are seeking answers to key questions affecting the interface between soldier, sailor, marine, airman and system. This article describes the evolution of the committee, outlines the specific concerns of each of its five subcommittees, and discusses related initiatives NSIA has instituted to address major issues in this area.

In 1944, James Forrestal, the Secretary of the Navy, recommended the establishment of the Navy Industrial Association. He proposed an association through which industry could bring to the Navy its point of view on such matters as contracts, production procedures, and specifications and requirements. The association would also serve, in Forrestal's view, as a channel for the Navy to "enlist the knowledge and support of industry on mutual problems, especially those involved in scientific research and in technical, industrial or commercial processes which would be useful." In 1947, as the first Secretary of Defense, Forrestal proposed that the group expand its activities to work with all the military services and be renamed the National Security Industrial Association.

Forty years later, NSIA is a national organization of more than 350 manufacturing, research, and service companies, large and small, bonded by a common goal

industry and government and offers counsel through the recommendations of its committees, ad hoc groups, and chapters; it also provides continuing education and fosters ongoing dialogue through a variety of local and national symposia and conferences.

The association includes thirteen regular committees, each comprised of representatives from member companies and each addressing a specific area of mutual concern to government and industry. The committees are: anti-air warfare; anti-submarine warfare; automatic testing; command, control, and communications; international; legislative information; logistics management; manpower and training; manufacturing management; procurement; quality and reliability assurance; research and engineering; software; and the amphibious warfare group. The newest of these, and the focus of the remainder of this article, is the manpower and training committee.

The fact that NSIA created this committee should not be interpreted as an indication of a lack of prior interest in manpower, personnel, and training-related issues. NSIA symposia and briefings, both large and small, have covered these issues for many years. Prior to 1984, a personnel and training group was a subset of the logistics management committee, primarily because of the close relationship between logistics and maintenance training.

However, over the past four years, the issues of trained-manpower shortages and the readiness of our troops have become much more prominent. Consequently, Lt. Gen. Edgar A. Chavarrie, the Deputy Assistant Secretary of Defense (Military Personnel and Force Management), suggested that NSIA consider establishing a personnel and training group as a regular committee of the association. NSIA reviewed the various factors involved and on May 9, 1984, the association's executive committee approved the formation of the manpower and training committee. In chartering the new committee, NSIA directed that it work "with DoD organizations and other NSIA committees and member companies to promote the cost-effective integration and utilization of the personnel subsystem in the design of emerging weapon systems through symposia, ad hoc working groups, studies, publications and continuing communication between government and industry managers and technicians."

To cover all aspects of the interface between service

committee deals with the position of the service member in the system in relation to his or her various requirements—training, job information, and performance—and the impact of technology on each of these. Working closely with the military services, the subcommittee is looking into a number of problems, including the determination of comprehension levels needed by enlisted personnel to perform their tasks on complex weapon systems and the need to consider human performance factors such as personal safety throughout the development of a new system.

The *learning system design subcommittee* is addressing the inclusion of state-of-the-art instructional system design in new weapon system procurements. It is also advancing research into personnel requirements and the analysis of training curriculum design.

The *trainers and simulators subcommittee* is focusing on the use of simulation-based trainers, both part-task and full mission, to evaluate the readiness of individual operators, crews, and maintenance personnel. It is also participating in the identification of promising new technologies for training system applications.

The *training operations subcommittee* is studying the effectiveness of various techniques for implementing training, both in formal schools and in the field. It is also advancing improvements in evaluation measures and performance criteria.

Finally, the *education subcommittee* is striving to assure the availability of trained professionals to support and enhance education and training development programs in government, industry, and academia. The subcommittee is also working to advance the state of the art in research relevant to military training technology.

Other specific activities are conducted within the framework of these formal subcommittees as well. They include two special-project working groups, a new publication, *Training Technology Journal*, and periodic meetings and symposia.

The *VHSIC/TRAINER technology working group* is new and was created at the suggestion of the Naval Training Equipment Center in Orlando, Florida. The group will investigate the potential for incorporating very high speed integrated circuitry technology into training systems.

The *computer working group* is addressing the application of computers to training devices. With the in-

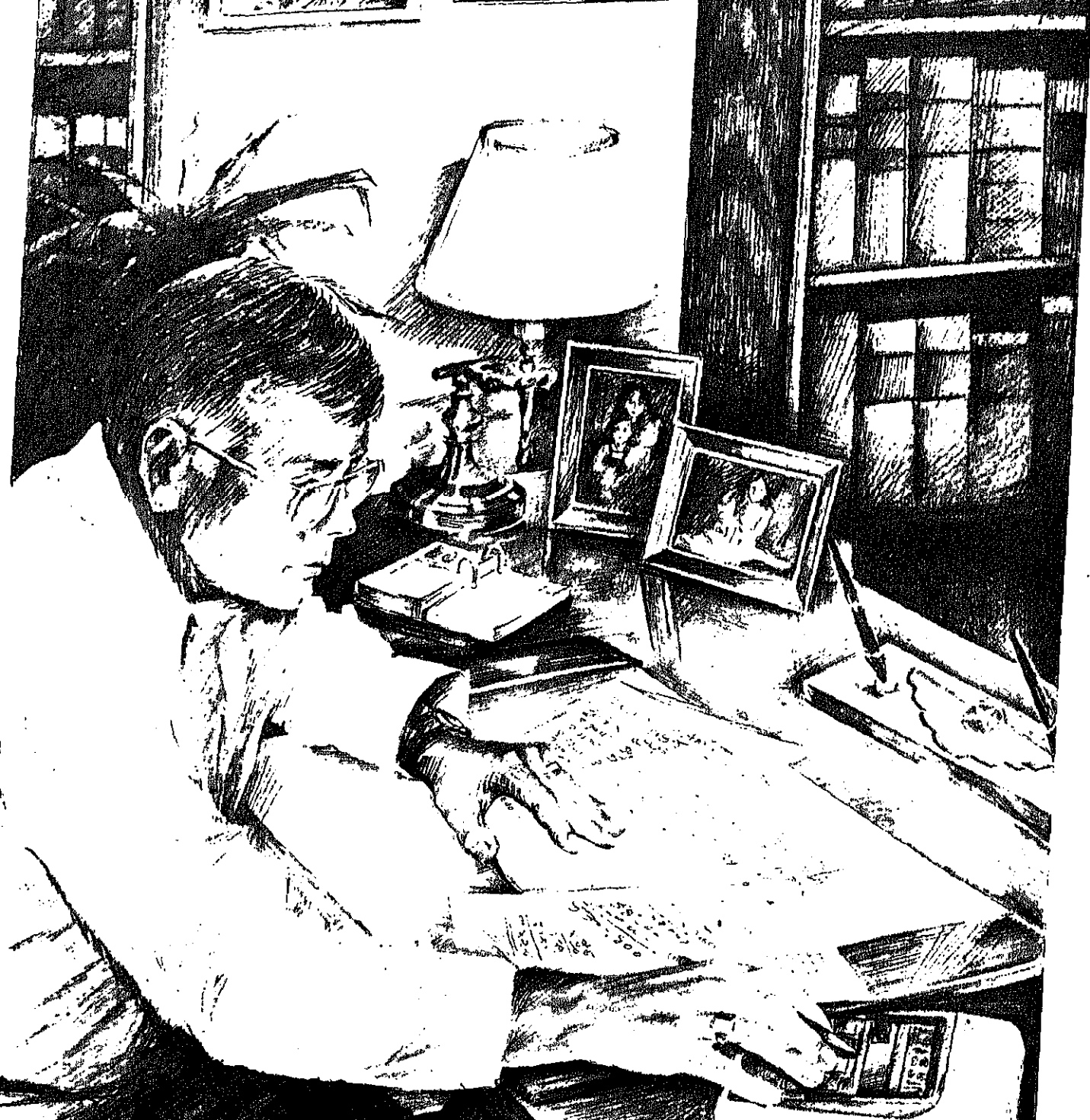
nal is designed to achieve close communication between and within industry and government in the field of training technology, particularly with regard to requirements, problems, and new developments.

Finally, each year there are several symposia and meetings sponsored by one of the military services with the support of NSIA. For example, in May the Army Research Institute for the Behavioral and Social Sciences sponsored the Fourth Annual Conference on Personnel and Training Factors in Systems Effectiveness, which drew more than 200 government and industry participants. The Air Force's Human Resources Laboratory and the Navy's Personnel Research and Development Center will be the sponsors in 1985 and 1986, respectively.

A very large-scale meeting is the Annual Interservice-Industry Training Equipment Conference. This year, the conference was held October 22-24 in Washington, DC, with NSIA as sponsor, in coordination with the Department of Defense. The U.S. Army, through its Program Manager for Training Devices, was the lead service, and some 1,400 participants attended. In alternate years, the American Defense Preparedness Association is the industry sponsor, and the Navy and Air Force, through the Naval Training Equipment Center and the Air Force's Deputy for Simulators, respectively, also alternate annually as lead service. Other conferences aimed at resolving specific training-related issues are being developed. In addition, the manpower and training committee is considering expanding the scope of its activities to include cooperative efforts with NATO.

Ultimately, though, it is the continuing spirit of cooperation between industry and government that will make NSIA's manpower and training committee an increasingly important and effective instrument in furthering the military readiness upon which the security of our nation critically depends. **DMJ**

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Two options for revamping Survivor Benefit Plan offsets

By WILLIAM C. LETZKUS
and
CHARLES R. MARGENTHALER

Revising computation procedures for the SBP offset would generally result in lower offsets to the annuity and might encourage greater participation in the plan.

Upon retiring from active duty, professional military members must decide whether or not to participate in the Survivor Benefit Plan. Financed in part by direct deductions from participants' monthly retirement pay, the plan provides an annuity to a member's designated survivors. But participation among retirees has never reached the 85 percent level projected when the plan was set up in 1972. In fact, despite improvements to the plan in 1980, overall participation rates dropped from 58.6 percent in 1977 to approximately 55 percent in 1983.¹

Why?

According to the Fifth Quadrennial Review of Military Compensation, there is no clear answer as to why the participation is so low. One possible answer lies in the perception of some servicemembers that the SBP, when integrated with Social Security, is not as good a value as can be obtained from investment in the private sector. Originally, Congress set the Social Security offset to the plan at 100 percent; later, in 1980, it amended the law to limit the offset to no more than 40 percent of the gross SBP annuity. In other words, a surviving spouse now receives at least 60 percent of the SBP an-

nuity, regardless of the amount of the computed Social Security offset. Even so, participation has not increased.

Apparently, the offset is still too large to make the Survivor Benefit Plan attractive to greater numbers of retirees. What our analysis indicates is that because current SBP offset computations use the Social Security benefits formula and ignore nonmilitary wages, they result in the highest possible SBP offset. Two alternative methods of computation are available, however, and both would yield an equitable offset amount.

What constitutes an equitable offset? In establishing the annuity plan, legislators invoked the concept of a "benefit floor"—a survivor's benefits should equal 55 percent of the total of both military retirement pay and Social Security benefits. The Senate Armed Services Committee report on the SBP (No. 92-1089, 92nd Congress, 2nd session, 1972, p. 29) explicitly stated, "It is appropriate to consider all sources of payments resulting from government service in attaining the 55 percent. The Social Security system is one of those sources."

The same report (p. 62) took note of Defense Department comments concerning the benefit floor. If the full Social Security benefit attributable to a member's military service were to be offset, DoD pointed out, the to-

¹Office of the Assistant Secretary of Defense (Manpower,

- Index the member's covered (military) wages.
- Compute average indexed monthly earnings, referred to as AIME.
- Compute the primary insurance amount, or PIA.
- Calculate the SBP offset.

The process is based on the Social Security benefit formula, with the express proviso that only covered military wages are to be used in the computation. (For a full discussion of both the offset and the SBP overall, see Letzkus and Margenthaler, "You Bet Your Life—the Survivors Benefit Plan," *Defense Management Journal*, Fourth Quarter 1981, pp. 40–50.) The primary insurance amount serves as the basis for computing the SBP offset as well as all Social Security benefits. Deriving this amount is a matter of applying a benefit formula (a set of percentage factors) to "bend points" (dollar thresholds) in the retiree's average indexed monthly earnings. A member's benchmark year—the year the individual reaches age 62, becomes disabled, or dies—determines what his or her bend points will be. But the index year for purposes of computation is the second year preceding the benchmark year.

For an individual retiring in 1979, the first year subject to current Social Security provisions, the PIA is the sum of 90 percent of the first \$180 of AIME, 32 percent of AIME over \$180 and through \$1,085, and 15 percent of AIME over \$1,085. The bend points for this primary insurance amount are valid only for those individuals whose benchmark year is 1979. Although the percentage factors remain constant at 90, 32, and 15 percent, the bend points are adjusted annually based on the change in average wages for the index year. Due to the 7.941 percent increase in 1978 average wages, for example, the 1980 bend points became \$194 and \$1,171. Figure 1 lists actual bend points through 1983 and projects them through 1997.

Though military members must decide whether they will participate in the SBP shortly before they retire, at that point they can only estimate both the PIA and the SBP offset attributable to covered military earnings. These estimates will change over time due to changes in bend points and to indexing of covered wages to the second year prior to the benchmark year. Moreover, the benchmark year, *not* the year of retirement from the military, determines both Social Security benefits and any offset to the SBP annuity based on those benefits.

Benchmark	90%	32%	Benchmark	90%	32%
1979**	\$180	\$1,085	1989	\$366	\$2,224
1980	194	1,171	1990	387	2,357
1981	211	1,274	1991	410	2,498
1982	230	1,388	1992	434	2,647
1983	253	1,527	1993	451	2,805
1984	273	1,649	1994	478	2,973
1985	292	1,764	1995	506	3,151
1986	309	1,869	1996	536	3,340
1987	327	1,981	1997	568	3,540
1988	346	2,099			

* Assumes growth in average wages of 8% for 1982, 7% for 1983, and 6% for each year thereafter

** For years 1979 through 1983, bend points are actual

the computations involved in estimating an SBP offset. Assume an individual retires in 1983 with maximum covered military wages from 1957 (the year military members became subject to Social Security) through 1982. If the member is age 62 at the time of retirement, 1983 is his or her benchmark year, and the individual's bend points are \$253 and \$1,527 (see Figure 1). By contrast, if the retiree reaches age 62 in 1997, that becomes his or her benchmark year, and the projected growth in average annual wages assumed in Figure 1 will result in bend points at \$568 and \$3,540. Figure 2 lists the individual's maximum covered military wages indexed to both a 1983 and a 1997 benchmark year.

For the person who is 62 in 1983, the primary insurance amount will be \$540.78, the sum of \$227.70 and \$313.08. The figure of \$227.70 represents 90 percent of the first \$253 of the member's average indexed monthly earnings. The figure of \$313.08 is derived through a series of calculations, beginning with dividing \$517,178.89, the individual's total indexed wages attributable to military service (see Figure 2), by 420 months, which equals the person's 35 years of total relevant service; the result, \$1,231.40 (the average indexed monthly earnings), is then reduced by \$253 and in turn multiplied by 32 percent.

If the person does not reach the benchmark year until 1997, the bend point changes from \$253 to \$568, as in-

1958	3,673.80	4,200	3.7490	15,745.80	8.7175	35,613.50
1959	3,855.80	4,800	3.5720	17,145.60	8.3061	39,869.28
1960	4,007.12	4,800	3.4372	16,498.56	7.9924	38,363.52
1961	4,086.76	4,800	3.3702	16,176.96	7.8367	37,616.16
1962	4,291.40	4,800	3.2095	15,405.60	7.4629	35,821.92
1963	4,396.64	4,800	3.1326	15,036.48	7.2843	34,964.64
1964	4,576.32	4,800	3.0096	14,446.08	6.9983	33,591.84
1965	4,658.72	4,800	2.9564	14,190.72	6.8745	32,997.60
1966	4,938.36	6,600	2.7890	18,407.40	6.4853	42,802.98
1967	5,213.44	6,600	2.6418	17,435.88	6.1431	40,544.46
1968	5,571.76	7,800	2.4719	19,280.82	5.7480	44,834.40
1969	5,893.76	7,800	2.3369	18,227.82	5.4340	42,385.20
1970	6,186.24	7,800	2.2264	17,365.92	5.1771	40,381.38
1971	6,497.08	7,800	2.1199	16,535.22	4.9294	38,449.32
1972	7,133.80	9,000	1.9307	17,376.30	4.4894	40,404.60
1973	7,580.16	10,800	1.8170	19,623.60	4.2250	45,630.00
1974	8,030.76	13,200	1.7150	22,638.00	3.9880	52,641.60
1975	8,630.92	14,100	1.5958	22,500.78	3.7107	52,320.87
1976	9,226.48	15,300	1.4928	22,839.84	3.4712	53,109.36
1977	9,779.44	16,500	1.4084	23,238.60	3.2749	54,035.85
1978	10,556.03	17,700	1.3048	23,094.96	3.0340	53,701.80
1979	11,479.46	22,900	1.1998	27,475.42	2.7899	63,888.71
1980	12,513.46	25,900	1.1007	28,408.13	2.5594	66,288.46
1981	13,773.10	29,700	1.0000	29,700.00	2.3253	69,061.41
1982	14,874.95	32,400	1.0000	32,400.00	2.1530	69,757.20
1983	15,916.19					
....						
1995	32,026.50			\$517,178.89		\$1,197,012.12

* Assumes growth in average wages of 8% for 1982, 7% for 1983, and 6% for each year thereafter.

** The index equals the average earnings in the index year divided by the average earnings in the year in question.

ever, and the retiree's projected PIA is \$1,241.45 (the sum of 90 percent of \$568 and 32 percent of \$2,282—\$2,850 less \$568).

The amount of Social Security benefits payable to a surviving spouse is a percentage of the wage earner's primary insurance amount. This percentage is determined by the survivor's age at the time of application for benefits and will not change thereafter. The SBP offset is also a percentage of the retiree's primary insurance amount, but is instead based on the survivor's age at the time he or she becomes entitled to survivor benefits. If the surviving spouse is less than age 62, there is no SBP offset. Once a surviving spouse attains age 62, the SBP offset factor is 82.9 percent of the retiree's primary insurance amount (or 40 percent of the SBP benefit, if less).

Applied to the 1983 PIA from the hypothetical case just described, the 82.9-percent factor yields an SBP offset of \$448.30 (82.9 percent of \$540.78). If applied

mated offset of \$1,029.20 (82.9 percent of \$1,241.45). As noted above, however, in neither instance can it exceed 40 percent of the SBP annuity.

The generally held view is that apportioning Social Security benefits among subsets of the earnings record is not possible; most analysts contend that the Social Security benefit is a function of the total earnings record. As the two hypothetical cases indicate, however, computation of the SBP offset now ascribes all indexed covered military wages to the two highest Social Security recovery bands (90 percent and 32 percent). The implicit assumption is that covered military wages provide greater Social Security benefits than do nonmilitary covered earnings. Moreover, as explained below, ignoring nonmilitary covered wages in computing the SBP offset results in an extremely high offset amount.²

Section 1451 of Public Law 92-425 (as amended) calls for an SBP offset based solely upon the military service of the retiree; it does not specify computation

the SBP offset, the law assumes that the retiree has worked in Social Security-covered employment only while on active duty. It essentially ignores all nonmilitary covered earnings in computing the offset.

At first glance, exclusion of nonmilitary covered wages might seem to benefit a surviving spouse by reducing the SBP offset attributable to the retiree's covered military wages. That is not the case, however. Rather, the survivor would benefit if computation of the offset took into account all Social Security-covered wages, both military and nonmilitary. Again, the underlying cause of this anomaly is the allocation of covered military wages between only the two highest Social Security recovery bands (90 percent and 32 percent).

But other options are available for computing the SBP offset. The two alternatives considered here equitably allocate both military and nonmilitary covered wages among all three Social Security recovery bands—90 percent, 32 percent, and 15 percent. One approach is based on existing Social Security procedures, the other on current SBP procedures.

The possible scenarios for illustrating these alternatives are virtually limitless, and this article uses a relatively conservative one. It posits an individual retiring from the military in 1983 at age 48 with maximum covered military earnings from 1957 through 1982, inclusive. After retirement, this person works in nonmilitary employment covered by Social Security. Figure 3 shows the individual's indexed covered nonmilitary wages (projected). Upon turning 62 in 1997, the person reaches a benchmark year, and thus 1995, the second year prior to 1997, becomes the index year.

The modified Social Security approach to determining the SBP offset differs from Social Security computation procedures only in its treatment of indexed wages. It distinguishes between covered military wages and covered nonmilitary wages, using only the former indexed figures to compute the retiree's primary insurance amount. For the individual in this hypothetical example the computation period is 35 years, as would be the case using current SBP offset computation procedures. That period excludes the low-five indexed years—1958, 1962, 1963, 1964, and 1965—all of which happen to be covered military years. The total indexed amount for

Figure 3. Covered nonmilitary wages indexed to a 1997 benchmark year

Year	Covered wages *	Index year: 1995	
		Index **	Wages
1983	\$35,700	2.0122	\$71,835.54
1984	38,600	1.8983	73,274.38
1985	41,300	1.7908	73,960.04
1986	43,800	1.6895	74,000.10
1987	46,400	1.5938	73,952.32
1988	49,200	1.5036	73,977.12
1989	52,200	1.4185	74,045.70
1990	55,300	1.3382	74,002.46
1991	58,600	1.2625	73,982.50
1992	62,100	1.1910	73,961.10
1993	65,800	1.1236	73,932.88
1994	69,700	1.0600	73,882.00
1995	73,900	1.0000	73,900.00
1996	78,300	1.0000	78,300.00
1997	0		
			\$1,037,006.10

* Given an actual wage base of \$35,700 for 1983, covered wages are assumed to grow 8% in 1982, 7% in 1983, and 6% each year thereafter.

** Indices are based on the same growth rates as those described in the previous footnote.

these years is \$173,989.50 (see Figure 2).

Computation of the individual's SBP offset under the modified Social Security approach would involve the following steps:

• **Determination of indexed wages to be included in the AIME computation:** That figure (\$2,060,028.72) is the sum of the member's nonmilitary wages (\$1,037,006.10) plus his or her military wages (\$1,023,022.62, or \$1,197,012.12 less \$173,989.50 for the low-five excluded years). Nonmilitary wages represent 50.34 percent of the total, while military wages account for 49.66 percent.

• **Computation of AIME:** Average indexed monthly earnings equal the total indexed wages (\$2,060,028.72) divided by the 420 months in the computation period. The result is \$4,904.80.

• **Computation of PIA:** Applying the Social Security recovery bands (90 percent, 32 percent, and 15 percent) to the bend points in the AIME for the 1997 benchmark year (see Figure 1) yields the primary insurance amount. In other words, the PIA is the sum of 0.9 times

²Some increase in the SBP offset also occurs due to changes over time in bend points and to the concentration of covered military wages in the higher recovery bands. But the

SBP offset of \$686.30 (0.829 times \$827.81). Based on current SBP offset computation procedures, the offset under the same scenario would be \$1,029.20, as described earlier.

The purpose of Social Security computation procedures, of course, is not calculation of the SBP offset, and thus they do not assign covered military and nonmilitary wages to any particular recovery band. Rather, they implicitly distribute all covered wages throughout the three recovery bands. As in the case of the hypothetical example just discussed, covered military wages may well be part of a member's low-five indexed years and thus would be excluded from computation of AIME under the modified Social Security approach to SBP offset computations. Current computation procedures, however, include *all* covered military wages and exclude all covered nonmilitary wages.

It is also possible both to attain an equitable SBP offset amount and to satisfy the requirement of Public Law 92-425, section 1451 (as amended), which calls for an SBP offset based solely upon the military service of the member. Using a modified version of current SBP computation procedures, such an approach would entail determining the average indexed monthly earnings attributable to covered military earnings and then allocating those earnings among the three Social Security recovery bands in the ratio of covered military earnings to total covered earnings (military and nonmilitary). These allocated amounts, multiplied by the relevant recovery band percentages, would give a PIA attributable to covered military earnings. This approach differs from current procedures only in the allocation of military-related AIME among the three Social Security recovery bands.

The following hypothetical example illustrates this alternative approach to computing the SBP offset. It uses the same 35-year computation period for AIME and assumes the same set of circumstances as the preceding example. However, the procedures differ from the first alternative in their treatment of covered indexed military wages (the low-five years of this example). This second alternative uses all indexed military wages, whether part of the low-five years or not, to determine the AIME attributable to military service. This AIME is then allocated to the three Social Security bands on the basis of the individual's total work history. All work years, including the low-five years, are used to determine the relative amounts of military versus nonmilitary

Effective September 30, 1985, the Social Security offset to the Survivor Benefit Plan will end for those beneficiaries whose entitlement to Social Security derives solely from their own earnings. The provision modifying the offset rule is part of the fiscal year 1985 Defense Authorization Bill recently passed by Congress and signed by President Reagan. The House Armed Services Committee also plans to do a thorough review of the overall SBP program during FY 1985.

As the accompanying article explains more fully, current offset procedures require that a beneficiary's SBP annuity be reduced by an amount equal to the Social Security retirement benefits he or she is eligible to receive based on the deceased spouse's post-1956 military service. That offset takes effect when a survivor first qualifies for Social Security payments (usually at age 62) and now applies even if he or she is entitled to those payments based on his or her own earnings.

The same legislation alters other provisions of the annuity program as well. One change will allow the service secretaries to start SBP payments when a participant is missing for at least 30 days and presumed dead. Another provision amends the Former Spouses Protection Act of 1982 by simplifying procedures for designating a former spouse as a beneficiary under SBP. If the arrangement is part of a court-approved divorce settlement, the retiree no longer has to complete certain paperwork in order for the designation to take effect. (*Army Times*: October 6, 1984)

ures 2 and 3) total \$2,234,018.22, of which 46.42 percent, or \$1,037,006.10, are nonmilitary and 53.58 percent, or \$1,197,012.12, are military. Average indexed monthly earnings attributable to military service would equal \$2,850.00, or \$1,197,012.12 divided by the 420 months in the computation period.

• *Computation of PIA:* For the 1997 benchmark year, projected bend points are at \$568 for the 90 percent Social Security recovery band and at \$3,540 for the 32 percent band (see Figure 1). As noted above, the proportion of indexed military wages to total indexed covered wages, both military and nonmilitary, is 53.58 percent, and that proportion is the basis for allocating

\$2,850 less \$1,898.75 (the sum of \$304.33 plus \$1,592.40), or \$951.25, is the portion for the 15 percent band. In sum, \$304.33 plus \$1,592.40 plus \$951.25 equals the total AIME attributable to military service. Applying the appropriate Social Security percentages to these three amounts yields the primary insurance amount attributable to military service. Thus, the PIA equals 0.9 times \$304.33 plus 0.32 times \$1,592.40 plus 0.15 times \$951.25, or \$926.46.

• **Computation of SBP offset:** As in the preceding examples, this scenario assumes a surviving spouse who becomes entitled to SBP at age 62; therefore, the SBP offset factor is 82.9 percent. Applied to the primary insurance amount, this factor yields an SBP offset of \$768.00 (0.829 times \$926.46).

Unlike these two alternatives, current SBP offset computations, by ignoring nonmilitary wages, place all covered military wages in the high recovery bands—90 percent and 32 percent—rather than distributing them among all relevant bands—90 percent, 32 percent, and 15 percent. Using different methodologies, the two approaches presented above distribute an individual's indexed military and nonmilitary covered wages among the three recovery bands in proportion to the inclusion of those wages in AIME. As the examples illustrate, both alternatives result in SBP offsets lower than would be obtained under existing procedures—\$686.30 and \$768.00 vice \$1,029.20.

Clearly, the method for allocating covered military wages among the three Social Security recovery bands largely determines the amount of the SBP offset. Current SBP offset computations allocate all military-related covered wages to the high recovery bands and thus result in the highest possible offset. In effect, this approach attributes minimal value to nonmilitary-related average indexed monthly earnings by implicitly assigning all of them to the lower two recovery bands.

In most instances in which an individual has covered nonmilitary employment, the modified Social Security approach discussed above will result in an offset amount considerably less than that derived using existing offset procedures. The second alternative, the modified SBP approach, will usually result in an offset amount somewhere between that yielded under the other two approaches.

If a retiree dies or becomes disabled before reaching age 62, the answer varies with regard to which approach

two alternatives discussed above will probably result in a lower offset.

For example, assume that the individual considered in the hypothetical examples had died in 1990 (without any covered wages in 1990). Based on covered military and nonmilitary earnings (as per Figure 3, but indexed to 1988), the offset amount for the surviving spouse would be \$688.80 under current SBP offset procedures, \$595.46 using the modified Social Security approach, and \$597.03 using the modified SBP approach. If the individual had not worked in covered nonmilitary employment, the offset amounts computed under the three approaches would be the same, because the computations would not differentiate between military and (non-existent) nonmilitary covered wages.

Generally, current computation procedures for the Survivor Benefit Plan result in offsetting the highest possible amounts from annuities. The greater the amount of nonmilitary covered wages, the more offsets computed under current SBP procedures exceed offsets computed by the two alternatives offered by this study. This occurs largely because of the computational treatment accorded nonmilitary covered wages and the growth in bend points over time. The net effect of these two factors is to assign a disproportionate share of covered military wages to the two highest Social Security recovery bands. Consequently, the amount of Social Security benefits attributed to covered military earnings is very high and, in turn, so is the SBP offset. Either the modified Social Security approach or the modified SBP approach to computing the offset would be more equitable. **DMJ**

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The Airlift Master Plan: evolution and implementation

By COLONEL THOMAS D. PILSCH, USAF

The Airlift Master Plan is a comprehensive document that addresses near- and long-term airlift needs for both inter- and intratheater operations.

Our strategy of deterrence through forward defense with limited peacetime presence requires a rapid deployment capability.

*—Secretary of Defense Caspar Weinberger
Annual Report to Congress, FY 84*

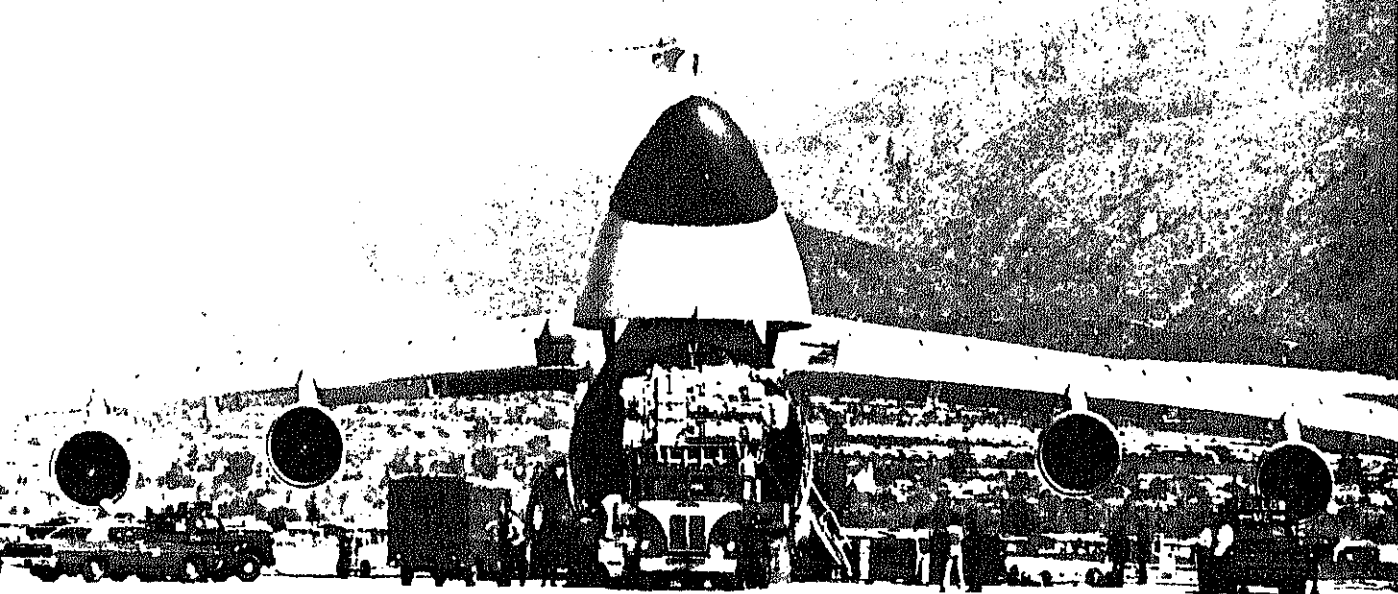
The ability to project and sustain combat forces in areas of the world vital to our interests has long been a cornerstone of American strategy. Due to changes in military technology since the end of World War II and the increasingly aggressive nature of potential adversaries, the United States now places a high premium on the ability to respond *rapidly* to a developing crisis. Adequate airlift is clearly critical to such a response, and major initiatives are in progress to provide it.

Like sealift and pre-positioning, the other two components of the force projection triad, airlift has always been a key factor in our mobility plans. But recent trends in world events have required that the United States place special emphasis on an ability to quickly introduce forces into any area where our interests are threatened and to quickly reinforce U.S. forces already deployed. In response to Defense Guidance to provide a minimum level of airlift capability, the U.S. Air Force published an Airlift Master Plan in 1983 as a blueprint for effectively managing acquisition of the additional

larly in the Persian Gulf, focused sorely needed attention on America's chronic lack of rapid mobility. Following formation of the Rapid Deployment Force, pundits quipped that the force was neither rapid nor deployable. Advocates for each leg of the force projection triad advanced proposals to cure the mobility shortfall, and competition for the finite defense mobility budget became intense.

In an effort to define the magnitude of the problem, Congress included language in the fiscal year 1981 Defense Authorization Act directing the secretary of defense to "conduct a comprehensive study to determine overall U.S. military mobility requirements." DoD completed the Congressionally Mandated Mobility Study, commonly referred to as CMMS, in April 1981, and it has become the basis for subsequent mobility planning decisions.

Not surprisingly, according to the study, there was a need for major improvement in all areas of mobility, and the study included recommendations for specific capability increases in airlift, sealift, and pre-positioning. Of particular significance, none of the proposed increases actually satisfied the shortfalls identified. They were merely fiscally realistic goals. For airlift, the recommended objective was an additional capability of 20 million ton-miles per day beyond the 46 million ton-mileage level projected for FY 86. This total of 66 million ton-miles per day has become the accepted goal for



The C-5 Galaxy airlifter, above, provides a much-needed boost to our near-term rapid deployment capability; the C-17, at right, is part of the long-term solution called for in the Airlift Master Plan.

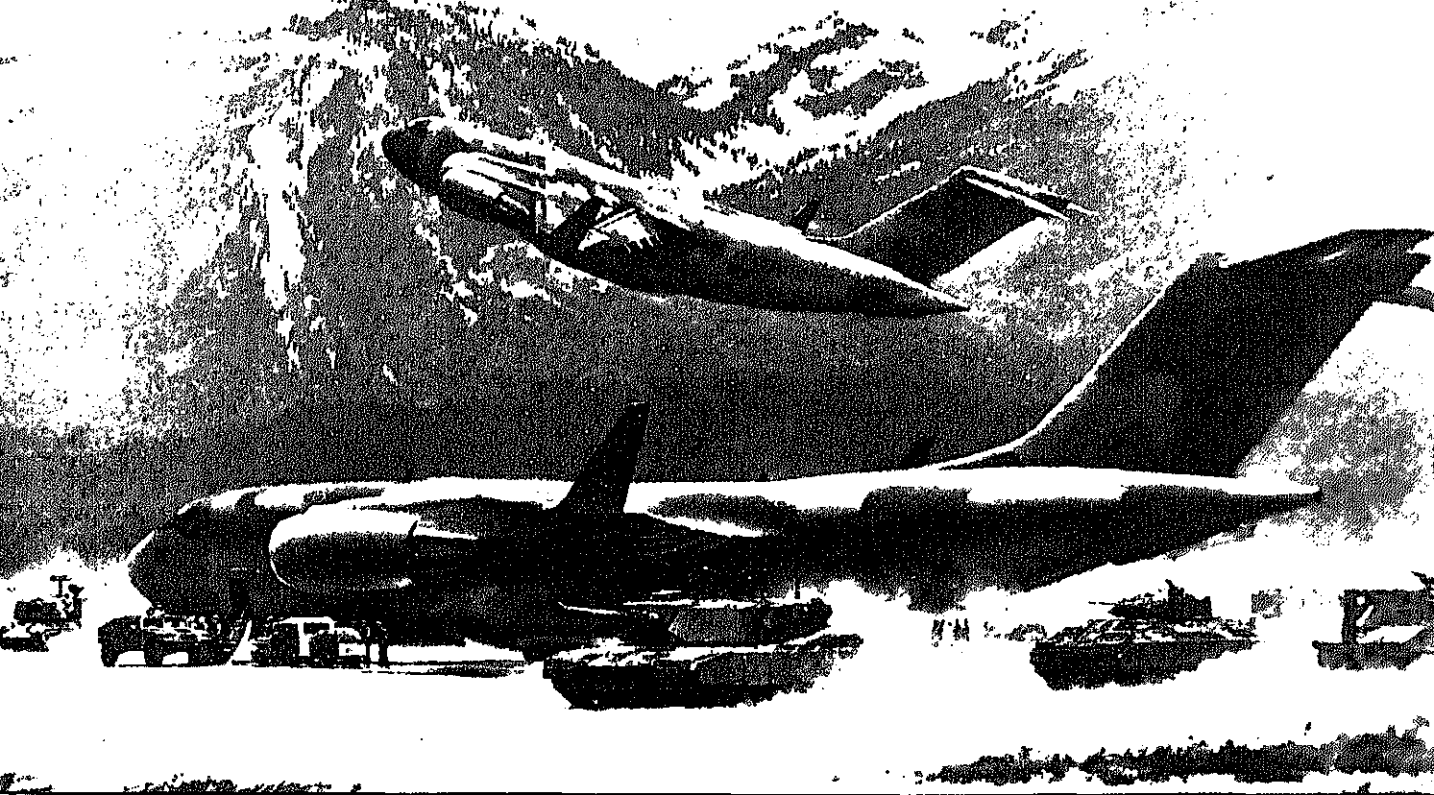
elapsed time), and effective daily utilization rate (that is, how many hours each day the vehicle actually moves cargo). It is a summation of the capability of a system of vehicles (in this case, aircraft) and provides a simple yardstick for determining gross system capability. But like all simple concepts, it has a number of drawbacks.

The most significant shortcoming is that ton-miles per day is a purely quantitative measure and thus ignores the quality of lift provided. For example, it makes no allowances for the characteristics of the cargo being carried (size, density, and so forth), nor for the unique environment associated with each airlift mission. The latter includes such factors as the desired onload and offload bases and the required delivery mode (airland,

of aircraft is not the equivalent of that available from another type, particularly when the subjective concept of military utility is also a measure of merit.

So what can the services do with a 66 million ton-mile per day capability? Let us accept the above caveats and assume a perfect match between types of cargo and airlift fleet, availability of the right types and numbers of bases at each end, and total dedication of a fully mobilized airlift system to the task—all very major assumptions. Given these conditions, that capability would allow DoD to move 15,700 tons every day from the central United States to central Europe (a distance of

¹The Congressionally Mandated Mobility Study did recognize the qualitative nature of the airlift requirement. One of its recommendations was that at least half of the additional 20 million ton-mile per day capability satisfy the requirement to carry large, outsize items of equipment such as armored vehicles, self-propelled artillery, large helicopters, and numerous combat support and combat service support vehicles. Further, the study group found that the ability to deliver cargo directly



approximately 4,200 nautical miles) or 10,300 tons in one day from the central United States to the Persian Gulf (about 6,400 nautical miles). Thus, from the military planner's perspective, the United States could theoretically move an infantry division (or a new light division plus its corps support units) to Europe in just under 2.5 days. Or, we could move that same division to the Persian Gulf in 3.7 days. By comparison, given current FY 85 capability of just under 36 million ton-miles per day, it would take 4.6 days or 6.8 days, respectively, to move the same single division.

At the time Congress directed the study to define total U.S. mobility requirements, an independent DoD inquiry into the nation's need for long-range intertheater airlift was already well along. In December 1979, at the request of the secretary of defense, a joint-service C-X Task Force began looking at every aspect of the airlift mission in order to define the characteristics of an aircraft that would fill our need for rapid force projection.

findings, see Thomas D. Pilsch, "The CX Requirement: Perspective on Airlift," *Airlift Operations Review*, January 1981, pp. 8-17.)

That request for proposal was unique. It did not specify the desired characteristics of the new aircraft (size, payload, and maximum gross weight, for example), as is traditionally the case. Instead, the document set forth a set of airlift tasks to be performed by a fleet of C-X aircraft in conjunction with a force of existing Military Airlift Command organic assets and Civil Reserve Air Fleet aircraft. It presented the tasks as part of four generic scenarios that covered a broad spectrum of forces to be moved, ranges covered, and supporting bases available. To aid prospective bidders, the request for proposal did provide broad guidelines on size, speed, and payload range. But industrial participants were left to their own ingenuity in designing an aircraft and sizing a fleet to fulfill the mission scenarios and at the same time satisfy the primary selection criteria of opera-

along by October 1980. To assist in determining between it and the request for proposal and to expedite what promised to be a lengthy acquisition cycle, the Office of the Secretary of Defense reviewed the above-mentioned scenarios in the request for proposal shortly before finishing the study ordered by Congress. The office's Directorate of Program Analysis and Evaluation did recommend minor changes to the request in order to more closely align the forces deployed with the size, weight, and cargo categories of those being considered for air movement by the study group. The Air Force agreed to incorporate these changes into the request for proposal, which the directorate had otherwise found to be generally consistent with the study.

Boeing, Lockheed, and McDonnell Douglas responded to the October 1980 request for proposal. In January 1981 the C-X Source Selection Evaluation Board formally convened to examine the proposals submitted. In August 1981 the secretary of the Air Force selected the McDonnell Douglas design, later designated the C-17, as winner of the competition.

Later that year, in September 1981, Lockheed-Georgia submitted an unsolicited proposal to build 50 more C-5 aircraft. The Air Force had previously purchased a fleet of 81 C-5A Galaxy heavy airlifters, the last of which was delivered in May 1973. Lockheed had proposed the C-5 as an alternative in the C-X competition, but the Air Force found that proposal not fully responsive to the requirements and returned it to the Georgia firm. In the foreword to their unsolicited proposal, Lockheed again cited major advantages in risk, cost, and availability to justify reopening the C-5 production line.

The decision concerning an airlift option was also a major issue as the Defense Department formulated its FY 83 budget submission. Eventually, in January 1982, DoD announced that it would purchase 50 improved C-5B airlifters as well as an additional 44 McDonnell Douglas KC-10 Extender tanker-cargo aircraft. The department also decided to increase Civil Reserve Air Fleet cargo capability through a modification program for existing passenger aircraft and to fund low-level research and development on the C-17. The announcement cited an overriding need to provide airlift capability as soon as possible. The schedule called for delivery of the first C-5B in December 1985, and the Air Force received the first additional KC-10 in August 1983 (the

Study. Thus, mobility planners still faced a serious problem—how to most effectively meet the intertheater airlift shortfall.

In the spring of 1983, Air Force planners began preparing a series of master plans which outline how the service proposes to meet its documented force structure needs into the 21st century. The first of these documents, the U.S. Air Force Airlift Master Plan, was approved in September 1983. Written by planners on the Air Staff and at Headquarters, Military Airlift Command, it included a comprehensive survey of airlift assets then programmed to be available, goals to be met, factors such as fleet age and manpower and fiscal constraints, and, finally, options available for satisfying capability goals.

Although long-range airlift requirements have traditionally received higher priority, Defense Guidance also directs significant improvements in capability to move personnel, equipment, and supplies by air within a theater of operations. The Airlift Master Plan stipulates a significant increase in intratheater airlift capability.

Because of the shorter ranges involved and the larger proportion of time spent loading and unloading aircraft, mileage covered is not a dominant factor in planning intratheater operations. Accordingly, the measure of capability for intratheater airlift is tons per day, not ton-miles per day, as is the case for long-range operations. The present fleet, consisting of 512 C-130 Hercules transports, has a combined lift capability of 9,200 tons per day.² Assuming we could concentrate all our C-130 assets for the purpose, this quantity of lift would theoretically allow the United States to move a mechanized infantry brigade within a theater of operations in just over a day and a half.

Unfortunately, the ton-per-day measurement does not take into account qualitative factors, which, for the example cited, would be overriding. The C-130—still the world's premier tactical airlifter almost 30 years after its first flight—cannot accommodate the large, outsize equipment that makes up a major portion of the Army's firepower inventory. Our airlifters have limited capability to airlift heavy units—including the firepower sup-

²This number includes only effective or primary aircraft authorization airframes, as do the figures for numbers of aircraft on the facing page. The total fleet includes a small proportion (ideally about 15 percent) of additional aircraft de-

Another major factor addressed in the plan is the age of the present Air Force organic airlift fleet. The C-141 Starlifter, backbone of the service's long-range airlift force, entered the fleet in the mid-1960s. These aircraft are reaching the 20-year point in their life cycles and thus support costs are likely to increase. While the Air Force will have to retire some of its higher-use C-141s in the mid-1990s, it can continue operating the bulk of the Starlifter fleet (approximately 180) at reduced levels well into the next century. But all of these workhorse airlifters will have to be replaced by the year 2015.

The service life of the intratheater C-130 fleet presented an even more pressing problem to Air Force planners. The more than 100 C-130A aircraft are almost 30 years old and cannot economically continue in service beyond 1990. Sometime after the turn of the century, the service will also have to replace the B-model and early E-model C-130s, which bore such a heavy burden of theater airlift in Southeast Asia.

Demographics also played a role in defining the boundaries within which airlift planners had to work. The United States faces a declining pool of young people in the prime military enlistment ages of 17 to 21, and experts estimate that by the end of the century the services will have to recruit one of every two eligible males to meet military manning goals. Of more immediate concern to the authors of the plan were congressionally imposed military manpower ceilings which provided for only minimal growth in the number of active-duty people. Any plan to expand airlift capability would have to have minimum impact on total personnel requirements.

The final major concern in devising the airlift master plan was an obstacle familiar to all planners, fiscal reality. At a time when requirements for modernization and force expansion are placing an increasing strain on the defense budget, the plan to meet airlift goals had to provide for a significant increase in capability with as little impact on the budget as possible. Both acquisition and ownership costs were factors; total costs over a projected 30-year life cycle were a prime decision driver.

In sum, the airlift planners faced an exacting task. The requirements were formidable:

- A significant increase in intertheater capability, which had to be compatible with the large, outsize items that make up the bulk of Army and Marine firepower

the 66 million ton-mile per day goal. They focused their attention on two options.³ The first, acquisition of a fleet of existing, in-production aircraft, would require that the Air Force purchase 156 additional C-5B and 180 C-130 aircraft. The projected 30-year life cycle cost (acquisition, plus operation and maintenance) for this force was \$43 billion in FY 82 constant dollars; it would require 15,028 more manpower positions than do current FY 89 airlift plans. The estimated 30-year life cycle cost for the second option, development and acquisition of 180 C-17 airlifters, was \$27 billion in FY 82 constant dollars; that figure includes expenditures for research and development. The C-17 option would add 245 manpower positions to FY 89 levels.

The first option offered lower acquisition costs because the candidate aircraft were already in production and required no expenditures for development or start-up. Outweighing this advantage, however, were higher costs to operate and maintain the larger fleet of older technology airframes. Also, this option provided neither the necessary intratheater tonnage capability to meet Defense Guidance goals nor the ability to move outsize equipment to and from small, austere airfields, a need highlighted by the Congressionally Mandated Mobility Study.

Acquisition costs for the second option were higher because of the requirement for C-17 research and development. But ownership costs over the fleet's life were lower due to the C-17's fuel-efficient design and designed-in reliability and maintainability; they more than offset higher procurement costs. The drastically lower personnel requirements under this option derive in part from these design features and also from elimination of the need to replace the 180 C-130s being retired.

The C-17 is able to provide the capability lost with the retirement of the older C-130s because it can move cargo, including outsize items, to and from small airfields within a theater. It also reduces intratheater airlift requirements by delivering cargo directly from the United States into small airfields near its destination, thereby eliminating the need for transshipment through large, main operating airfields (see sidebar on following page). The operational flexibility afforded by the

³Of the six options examined, two addressed near-term modernization of the force with no increase in capability; two addressed medium-term modernization with a limited increase in capability; and two addressed long-term modernization with a significant increase in capability.

Avoiding airport saturation

Studies have shown that if the Air Force were to continue adding present-generation aircraft to its fleet in order to meet established capability goals, those aircraft would soon saturate the relatively limited number of major airports that can accommodate them. Saturation would mean a decrease in effective capability for the entire airlift system, a situation analogous to the impact expansion would have on large motor freight networks.

Such systems rely on 18-wheel tractor-trailers to haul freight over long distances, but these large rigs move only between terminals located just off interstate highways on the outskirts of major cities. There the freight is offloaded, sorted, and reloaded onto vans or small trucks for delivery into the city. As in the case of the airlift system, adding present-generation vehicles would eventually overload existing terminals.

Building more terminals or expanding existing ones are two alternatives, but both are extremely expensive. Moreover, companies cannot adequately predict where future market activity and growth will be concentrated. Sending the 18-wheelers directly into the congested cities is another option, but an inefficient one that would ultimately slow the system flow.

The preferred solution would be a truck that has about two-thirds the capacity of an 18-wheeler and is efficient for long hauls, cheap to operate, and compact and maneuverable enough to get into the narrow streets and alleys where customers need their goods delivered. These new trucks could provide long-distance, door-to-door service and, when needed, could assist in shuttling freight from the terminals into the cities. They would free the larger tractor-trailers for terminal-to-terminal operations. This solution, the direct delivery option, closely parallels the airlift decision made by the Air Force.

C-17's direct delivery capability is the primary qualitative factor differentiating this second option from the first.

The choice was clear. The C-17 offered 30-year life cycle savings of \$16 billion and permitted the Air Force

takes as its starting point the proposed FY 89 airlift force, the basis for which is the mix of 50 C-5Bs and 44 KC-10s set forth in the January 1982 airlift decision. These aircraft will provide a sorely needed, near-term boost to our rapid reaction capability. The Air Force fully intends to complete this first phase of its airlift capability buildup and then proceed with acquisition of the C-17 as a long-term solution. The plan is C-5, then C-17.

The Airlift Master Plan constitutes a detailed blueprint for attaining national military airlift goals, and the Air Force is taking steps to incorporate the plan into its planning, programming, and budgeting process. Near-term goals, built into the current Five Year Defense Plan, include completing the acquisitions agreed upon in January 1982 as well as beginning full-scale development and initial acquisition of the C-17. The long-term objective is to procure 210 C-17 aircraft by 1998.

Production of the KC-10 Extender continues at the rate of one per month at the McDonnell Douglas facility in Long Beach, California. By the end of FY 84, the company had delivered 25 of these three-engine aircraft. Delivery of the sixtieth KC-10 is scheduled for September 1987.

The KC-10 airlifter is a military derivative of the DC-10-30 convertible freighter; the principal modifications include a large cargo door and a strengthened main floor. Additionally, the KC-10 has extra fuel tanks, installed in what was the lower fuselage cargo area, an advanced design aerial refueling boom, and a boom operator's position. Even with these added features, the aircraft retains some 88 percent commonality with the civilian DC-10.

The Strategic Air Command operates the KC-10, but the concept of operations calls for multipurpose use as an aerial tanker to support the mobility of general purpose forces and as a cargo carrier as well. It can carry a payload of all fuel, a mixture of fuel and cargo, or all cargo (up to 85 tons). One scenario envisions the KC-10 taking off just ahead of a flight of deploying fighters, carrying a load of support equipment and personnel, refueling the fighters enroute, and then landing at the destination fighter base to offload the cargo. Even as a pure tanker, the KC-10 can use its large fuel capacity to boost airlift productivity; by eliminating enroute

will incorporate changes to the hydraulic and landing gear in order to improve maintainability. The avionics package and corrosion protection will also be upgraded. In addition, the C-5B will incorporate all engineering improvements made to the C-5A, including the latest version of the General Electric TF-39 turbofan engine.

The 50 new C-5B Galaxy aircraft will be an impressive addition to U.S. intertheater airlift capability. Each will have a payload capacity of up to 130.5 tons and can carry up to 36 pallets of cargo. The Galaxy can accommodate all of the Army's largest firepower support equipment and helicopters. In any future deployment, these 50 new aircraft, along with the 77 A-models still in the inventory, will account for a significant portion of our movements into major aerial ports during a contingency.

The C-17 is scheduled to enter full-scale development in FY 85, with production to start in FY 88. Scheduled dates for first flight and initial operational capability are December 1989 and early 1992, respectively. The program has continued under low-level research and development funding since 1982, and engineers have accomplished much important work during this time. Most of the wind tunnel testing is complete, and mock-ups of the flight deck and cargo compartment have been built. Engineers have also done design work on such innovative components as the thrust reversers for the Pratt & Whitney 2037 turbofan engines. These engines, certified by the Federal Aviation Administration in December 1983, will have logged more than six million civil flight hours on the Boeing 757 prior to the first C-17 flight. They are part of a risk- and cost-reduction strategy to make maximum use of proven, state-of-the-art components for this new airlifter.

The C-17 will have a maximum payload of 86 tons and will be able to carry this load more than 2,400 nautical miles without refueling. It will accommodate all of the Army's major firepower and support items, including tanks, self-propelled artillery, and helicopters. Not only will this lifter be able to carry a wide variety of heavy loads, but it will also be able to deliver them over intercontinental distances directly into small, austere, forward airfields near locations where the Army will need to deploy and fight. This feature has been a design criterion of the aircraft from the very start.

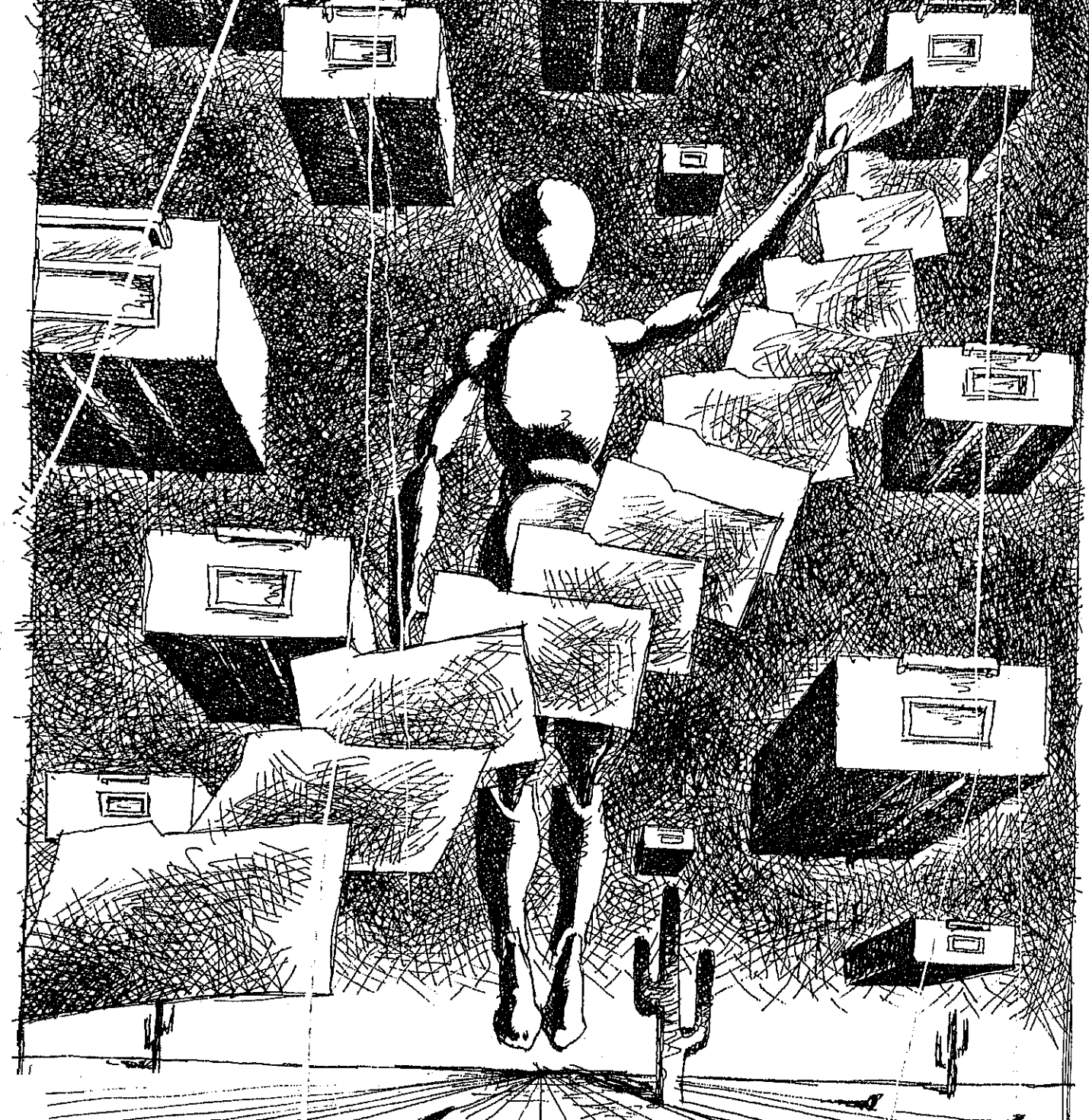
Additional lift for short takeoff and landing will be

pressive as the short landing and takeoff performance of the C-17 will be, though, the real key to its direct delivery capability will be its compatibility with small, austere airfield environments once on the ground. Its compact design, tight turning radius, and ability to maneuver in reverse under its own power will permit safe, routine airlift operations into the forward airfields where ground forces need to go.

Implementing the Airlift Master Plan is not going to be cheap. The president's revised FY 85 budget requested \$2.5 billion for the three airlift programs—\$566 million to continue the KC-10 multi-year buy, \$1.782 billion to buy 8 C-5Bs, and \$129 million to begin full-scale C-17 development. These and other mobility expenditures have not gone unchallenged. Yet the United States spends many times this figure each year to purchase needed general-purpose forces of all types. Do such expenditures make sense if we cannot move those forces to world trouble spots quickly enough to deter aggression or, failing that, to resolve the resulting conflict as rapidly and on as favorable terms as possible?

The Airlift Master Plan is a long-term guide for achieving military airlift objectives. It builds on the existing program and is a balanced, systematic approach to meeting airlift requirements. It takes into account manpower and fiscal realities and accommodates needed force modernization. Implementation of the master plan is on track and must remain so if we are to provide the rapid mobility capability necessary to back our conventional deterrence posture. **OMJ**

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Contract administration in DoD: "Out of sight, out of mind?"

By ROBERT E. BARNES

Contract administration activities located worldwide provide contract surveillance, quality assurance, production surveillance, and other important services that save DoD millions of dollars.

What happens to a defense contract after award? In the minds of many, it goes into a file drawer—out of sight and out of mind—until, one day, the hardware appears at the door as if by magic.

If the contract is simple and well-written and the local contract administration service office is on the ball, this scenario may in fact take place. However, contract award is not really an end, but a beginning. Contract administration, which follows, is a vital part of the acquisition process as well and an extension of the program manager and procuring contracting officer functions. Some 27,000 people, blanketing the globe, are working full-time to ensure that the Defense Department gets what it is paying for. This article describes the contract administration service community within DoD, discusses some of its usual (and not-so-usual) functions, and highlights some of its benefits and successes. Although many people are familiar with one or more aspects of defense contract administration, few fully appreciate the true breadth and scope of the community and its work.

Although the Army, Navy, and Air Force all have their own contract administration service activities, the primary organization responsible for providing such services in DoD is the Defense Contract Administration Service under the Defense Logistics Agency. Virtually no one in the DoD acquisition community has not had

smaller contractor locations throughout the continental United States. It also has some larger plant representative offices, or PROs.

Personnel in nine Defense Contract Administration Service Regions administer most of the smaller, less complex contracts on an "as-required, where-required" basis. Within these regions are 39 smaller units called Defense Contract Administration Services Management Areas, or DCASMA's for short. They provide contract administration service on a geographic basis at all defense contractor locations except those served by plant representative offices.

Plant representative offices are exceptions to the rule. DoD establishes them at specific contractor locations when the volume and complexity of defense business warrant a full-time complement of contract administration service people in-plant. Such circumstances usually involve acquisition of one or more major weapon systems as defined by DoD Directive 5000.1. The Defense Contract Administration Service alone has some 40 plant representative offices across the country, and the military services have 41 more.

When a service has one or more major weapon systems contracts at a particular plant, DoD may assign contract administration responsibility for the facility to that military service. The service can then set up a plant representative office, but the office must administer all

to industry." The Navy currently has 13 such plant representative offices; the Army has 3; and the Air Force has 25. The Air Force has grouped its offices under a separate command, the Air Force Contract Management Division, headquartered at Kirtland Air Force Base near Albuquerque, New Mexico.

Together, the Defense Contract Administration Service activities and the services' plant representative offices constitute what is commonly thought of as the DoD contract administration service community. But many contract administration activities, including some of the largest, smallest, and oldest, belong to neither category. In terms of number of people, the sixteen offices under the Navy's Supervisor of Shipbuilding, Conversion, and Repair, commonly referred to as SUPSHIPS, are among the largest—the one at Newport News, VA, for example, employs more than 500 people. Located at or near major shipyards along the east and west coasts, the Gulf of Mexico, Lake Michigan, and Hawaii, these offices oversee the construction, conversion, overhaul, and repair of major naval vessels. In fact, available records indicate that the first defense contract administrator was a supervisor of shipbuilding of sorts. John Paul Jones, who supervised the construction of the frigate *America* in Philadelphia in 1781, later became her captain.

The Navy is also responsible for another specialized contract service, the administration of all DoD research and development contracts with educational institutions.

regulations and thus are another exception to the rule that the Defense Contract Administration Service is DoD's primary contract administration activity. The Office of Naval Research administers these contracts through a network of more than a dozen resident offices at or near major universities throughout the country.

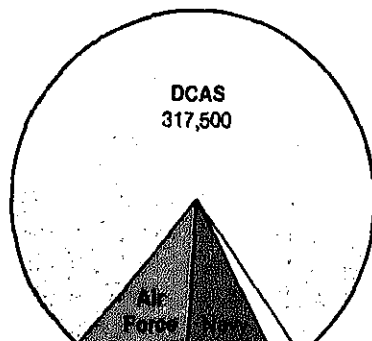
Administration of DoD contracts overseas is an area likely to expand rapidly in the near future. The United States is negotiating greater numbers of reciprocal agreements with European allies, arrangements which allow their contractors to compete on an equal footing with U.S. companies for the first time. As a result, DoD will have to administer more contracts in more overseas locations than ever before. In the past, requirements for overseas administration services have been infrequent and usually involved maintenance and repair contracts at specific locations for relatively long periods of time. The services have typically met these sporadic requirements on an ad hoc basis.

At present, both the Army and the Navy have small contract administration service contingents overseas, primarily collocated with their overseas buying activities. The Air Force has established a separate organization, the Air Force Contract Maintenance Center, which consists of six overseas detachments engaged primarily in administering Air Force Logistics Command contracts.

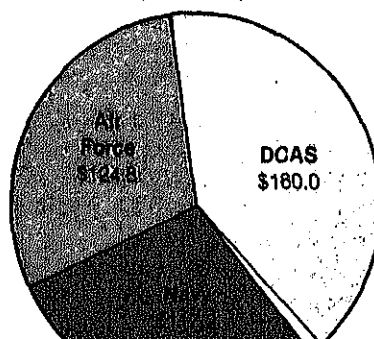
DoD is considering a number of options to enhance its ability to meet the increased demand in this area.

The distribution of DoD's contract administration workload

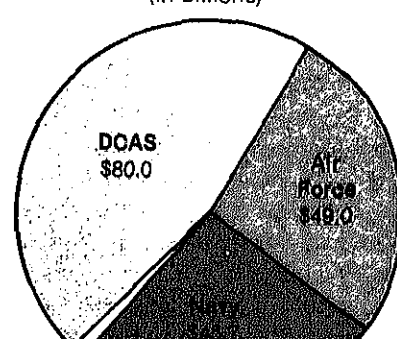
Number of contracts administered



Face value of contracts administered (in billions)



Value of remaining work (in billions)



preaward review teams involved in "should cost" or fact-finding efforts. They have firsthand knowledge of a contractor's operations and estimating procedures and can thus help the team ask the right questions.

Currently out for comment by the services is a proposal which would establish a number of "matchmaker" organizations around the world to bring together those who need overseas contract administration services with those best able to provide them.

Smaller organizations, headed by corporate administrative contracting officers, also have contract administration responsibilities. The Defense Department assigns corporate cognizance over certain multidivisional corporations to such officers, who negotiate with the contractor the allocation of corporate costs to various segments of the corporation. DoD's 53 corporate administrative contracting officers work for the Navy, Air Force, and the Defense Contract Administration Service. Costs incurred at the corporate level often amount to hundreds of millions of dollars annually for such big-ticket items as group health insurance, retirement benefits, and corporate aircraft. Both before and after contract award, administrative contracting officers negotiate what corporate costs will be allowed and how they are to be allocated. Those negotiations can have a great impact on how much cost the government ultimately bears.

In all, the various offices that make up DoD's contract administration services community administer more than 400,000 contracts worth \$407.1 billion (see figure). The contracts serviced cover the full range of items procured, from bolts to bombers, in every area of the country and overseas as well.

The Federal Acquisition Regulation (subpart 42.3) lists 61 mandatory and eight optional tasks to be performed by the contract administration office when it receives a contract to administer; DoD's supplement to the regulation lists four more. These tasks do not include either precontract functions such as pricing of proposals and preaward surveys or special functions discussed below. Organizational charts for contract administration service offices vary among the services and the Defense Contract Administration Service; however, most functions come under one of five broad categories: contract management, quality assurance, pro-

They approve payments, negotiate indirect and direct rates for overhead and labor, and analyze contractor proposals. Their duties also include surveillance of the contractor's system for materials purchasing and subcontracting and review and consent to the issuance of certain subcontracts. When delegated the responsibility by the purchasing office, they also negotiate price adjustments for prior changes to the contract.

Quality assurance. Quality assurance specialists review the contractor's quality control system and procedures, monitor system output, determine conformance to specifications, and formally accept the hardware or services on behalf of the government. Quality assurance is the oldest and by far the largest function in the DoD contract administration services community; it accounts for more than one-third of all personnel. In fact, the first dedicated government people in contract administration services were quality assurance inspectors. Organized in 1917, they formed a small group within the Army Signal Corps aviation group (forerunner of the Air Force) and performed itinerant inspection of aircraft under construction. The first permanent, in-plant contract administration services staff, established at the Boeing Company plant in Seattle, Washington, in 1920, also consisted of quality inspectors.

Production surveillance. Personnel assigned to this function monitor the contractor's manufacturing schedule and plant loadings and advise the buying activity of potential or actual slippages in scheduled deliveries. For example, they may notify the buying activity when late receipt of critical materials is likely to slow down the production line.

Payment. Responsibilities in this area include tracking funds and processing payments both for work-in-process and for final delivery of end items or services. Together, the three services and the Defense Logistics Agency process more than \$5.2 billion in checks each month from more than 80 disbursing offices around the country.

Miscellaneous functions. These include property ad-

cated design engineering, may work full-time.

Property administrators in DoD number about 800. They ensure proper accountability and control over government property furnished to contractors for use in performing government contracts. Items furnished may range from nuts and bolts to whole subsystems, such as jet engines, worth millions of dollars each. The government may even furnish one of a number of entire, fully equipped plants which it owns. The Defense Department currently supplies real property and equipment worth \$9.5 billion (as measured by original acquisition cost) to contractors for use on DoD contracts.

The above are customary contract administration services, always performed as needed. But other, more specialized services are available as well, though capabilities vary among contract administration service offices. Generally, the larger the contract and the larger the office, the more likely that the latter can provide the following services:

Up-front (precontract) services. Contract administration offices—especially plant representative offices—are a prime source of detailed knowledge about a contractor's operations and management and consequently can be of invaluable assistance in planning larger acquisition programs. They can provide a program office with unique and timely insights as it develops acquisition strategy. If a draft request for proposal is part of that strategy, the cognizant contract administration office should be on the distribution list for comments. They can frequently spot potential administrative problems—conflicting specifications, for example—early in the process, especially when the request includes unusual provisions or procedures such as work to be done on a military installation.

Input from contract administrators can also be useful when choosing a contractor under source selection procedures. Contract administration offices are a particularly good source of information on contractor past performance, which is rapidly gaining prominence as a source selection factor. Contract administration personnel can even participate as full-time members of source selection evaluation teams.

In addition, contract administration officials should always be members of any on-site preaward review teams involved in "should cost" or fact-finding efforts. They have firsthand knowledge of a contractor's opera-

tions, close coordination and communication between the program office and the contract administration office. On complex programs, the parties involved may sign a written memorandum of agreement or similar document defining the relationship; it should spell out exactly what is to be done, by whom, and how often. Possible support services to be provided include the following:

• **Management reviews.** The contract administration office can participate in regular program reviews involving the contractor and program office personnel. Contract administration staff may contribute input in specified areas or furnish data in preparation for, or as part of, the review. In addition, many plant representative offices provide periodic reports or presentations to the program offices concerning the status of contractor management systems or problem areas and their potential impact on the program. Here again, the on-site experience of the contract administration office may enable it to give a second opinion or new perspective that the program manager might otherwise lack. While a program office tends to focus on one program, contract administrators look at all programs in a plant and can spot potential conflicts in priorities among them.

• **Critical subcontract surveillance.** Numerous studies have shown that subcontracts account for half or more of the total value of major weapon systems contract dollars and that the most troublesome program problems often occur at the subcontract level. In fact, the magnitude of the problems has been such that the government has often broken out certain major subsystems such as engines or radars and bought them directly to gain closer control. Though DoD policy states that the prime is responsible for managing its subcontractors, the program manager and the procuring contracting office do not have to blindly ignore subcontracts and trust luck. Usually, a few subcontracts are critical to the overall cost, schedule, and technical performance of the end item. Once alerted to them, personnel can monitor the prime contractor's performance to ensure that proper management emphasis and visibility are present and that the prime is surfacing problems or potential problems and working them in a timely fashion. They can usually provide periodic formal status reports to the program office, if desired.

• **Negotiation support.** As set forth in the Federal Acquisition Regulation, the contract administration of-

program generated at least \$41 million in cost savings or costs avoided in fiscal year 1983 alone, a return on investment of more than fifty to one!

billing rates, for example—but only to the extent specifically authorized by the procuring contracting office. Often, the contract administration office's in-plant location puts it in a better position to negotiate such agreements than the procuring office, which may be thousands of miles away. Again, under these circumstances, the contract administration office is an excellent resource, and a memorandum of agreement can define the delegated authorities.

• *Analysis of the cost performance report.* If a program is subject to cost and schedule control systems criteria, the program office will have the capability to analyze cost performance reports in order to determine the impact of cost overruns or schedule slippages. But many contract administration offices have a surprising degree of capability in this area too, and a second opinion can be valuable to the program manager.

Systems reviews. By the nature of their mission, contract administration offices tend to orient their reviews more toward company-wide management systems than toward individual contracts or programs. But the results of these overall systems reviews can have major implications for individual contracts or programs. Accordingly, buying activities should have an appreciation for and an interest in them. The following are some of the more common systems reviews which may be especially relevant:

• *Contractor purchasing system reviews.* As mentioned above, on the average, 50 percent or more of prime contract dollars are, in turn, subcontracted. Therefore, how well the prime contractor's purchasing department is functioning is of vital concern to contract administrators. At smaller locations, the contractor is required to present certain individual subcontracts to the administrative contracting officer for consent to issue. When subcontracting activity reaches thresholds specified in Federal Acquisition Regulation 44.302, contract administration personnel do a formal contractor purchasing system review. If results are positive, the purchasing system is approved and most of the consent requirements set forth in FAR 44.201 are eliminated. To

of subcontracts or purchase orders. Buying offices have a big stake in the effectiveness of the purchasing system and may even wish to participate in the review.

• *Contractor employee compensation systems reviews.* A recent study by the Air Force Contract Management Division revealed that as much as 70 percent of all contract costs at all levels (both prime and subcontract) are in direct and indirect wages and salaries or fringe benefits. Moreover, officials at the highest levels in DoD have expressed much concern recently that defense industries may lack adequate incentives to properly control these compensation costs and maintain their comparability with nondefense segments of the economy. As a result, there has been a tremendous surge of interest lately in compensation issues.

Last December, for example, the under secretary of defense (research and engineering) formally assigned responsibility for conducting contractor employee compensation systems reviews for all services to the Defense Contract Administration Service. Over the next year or two, that agency and the services will be working together to strengthen the compensation review program and improve the effectiveness of these reviews. Individual contract administration offices will translate the results into negotiations of direct and indirect rates with the contractor, and these rates, in turn, should flow into future contract prices.

• *Automatic data processing equipment reviews.* Annual reviews of a contractor's automatic data processing equipment control systems and acquisitions are mandatory when the total cost of leasing computer equipment at the contractor's plant, division, or cost center is expected to exceed \$500,000 in any 12-month period and when more than 50 percent of that amount is to be allocated to negotiated government contracts (see DoD Federal Acquisition Regulation supplement 70.603). The purpose of these reviews is to ensure that contractors are meeting their automatic data processing equipment requirements in the most cost-effective manner. During 1983, two small hardware review teams, one located at Air Force Contract Management Division headquarters in Albuquerque, New Mexico, and the other at the De-

in Boston, Massachusetts alone accounted for cost savings or costs avoided of more than \$41 million. Given the potential for cost savings, DoD is placing renewed emphasis on reviews in this area and expanding coverage to include more contractors.

• *Cost monitoring reviews.* In plants with large amounts of sales to the government (as defined in DoD Federal Acquisition Regulation supplement 42.7002), contract administration personnel establish a formal program to review contractor management of direct or indirect cost. The programs focus on those areas that have greatest potential for generating savings, and normally contract administration office staff conduct the reviews jointly with Defense Contract Audit Agency auditors. Areas reviewed have included corporate aircraft, energy conservation, and executive vehicles. Procedures for selecting areas for review vary among the services, but whatever the mechanism, buying activities can suggest topics and even participate in the reviews. In fiscal year 1983, the Defense Contract Audit Agency reported potential cost savings or avoidances totaling more than \$200 million DoD-wide from this program.

• *Total business system reviews.* The Office of Naval Research, which is responsible for administering DoD research programs at educational institutions, does a kind of system review which is unique to the academic research community. These total business system reviews are comprehensive analyses of a university's financial and business management policies and procedures; they are undertaken to determine compliance with applicable federal statutes, cost principles, procurement regulations, and Office of Management and Budget directives. Analysts assess the economy, efficiency, and effectiveness of an institution's management policies and procedures and determine the allowability and allocability of research costs incurred under them. From these reviews, federal contracts and grants officers gain current information concerning the quality and reliability of academic research management operations and thus are better able to improve overall administration of university research contracts.

Cost accounting systems. Defense contractors with negotiated defense contracts in excess of \$10 million have to comply with certain cost accounting standards in allocating costs to government contracts. The cognizant administrative contracting officers, assisted by Defense Contract Audit Agency auditors, are responsible

involve considerable litigation. For example, in April 1983, an issue long disputed between the Boeing Company and the Air Force (Armed Services Board of Contract Appeals #19224) culminated in a U.S. Supreme Court decision supporting the government's position. The corporate administrative contracting officer had determined that the contractor was not in compliance with cost accounting standards involving allocation of state taxes to the contractor's business segments. In pursuing legal remedies, the contractor eventually petitioned the U.S. Supreme Court, which denied the petition and allowed the lower court's decision to stand.

The Air Force official's tenacity in upholding the government's interests resulted in immediate savings of \$35 million in settlement of prior years' overhead rates and estimated additional future savings of \$7 million per year for as long as the government does business at current levels with Boeing. The contracting officer won the 1983 Air Force "Top Contract Price Cutter" award for his efforts.

Most people consider contract administration service activities a source of "costs" rather than "profits." But that point of view ignores the savings they yield. For example, the entire cost of operating the contractor automatic data processing equipment review program described above, including salaries, fringe benefits, and travel, is approximately \$750,000 annually. Yet the eleven people who staff that program generated at least \$41 million in cost savings or costs avoided in fiscal year 1983 alone, a return on investment of more than fifty to one!

Contract administration service activities can and do contribute to lower defense costs, both directly and indirectly. They are an integral part of the DoD acquisition process and make significant contributions to effective and efficient acquisition of our nation's defense needs. **DMJ**

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Taking Disciplinary Action

by STEPHEN A. KLATSKY

*Mr. Klatsky is the senior civilian personnel
and law counselor at the Army Materiel
Command, Alexandria, Virginia.*

You are a branch chief in the comptroller directorate supervising a total of 10 professional and clerical personnel. One of your subordinates, a GS-12 auditor, has just taken his third two-hour lunch in a last month. You have reached the point where you are considering taking disciplinary action. The questions you probably will ask yourself include:

- Does the behavior constitute an offense that calls for disciplinary action?
- Is discipline warranted in light of the facts and given the circumstances under which the offense is committed?
- What is an appropriate penalty?
- What might the employee do to challenge the discipline imposed?
- What are some of the more common grounds on which employees have successfully based challenges?
- How can I motivate an employee whom I have not disciplined?

Unfortunately, these questions do not have neat and simple answers, and to consider all six will require more than one column. What follows is a discussion of the first three questions. Treatment of the latter three will be our focus in a future issue.

Although the federal government has no definitive list of acts of commission or omission subject to dis-

management has identified as so potentially disruptive to the work environment or to the employer-employee relationship that they warrant corrective measures.

In considering the hypothetical situation posed above, let us assume that the employee's two-hour lunches do indeed violate the eight hours'-work-for-eight-hours'-pay rule, office practice, and agency-established work schedules. In effect, each long lunch is an absence without prior supervisory knowledge or approval. More than likely, agency personnel regulations categorize this behavior as absence without official leave, or AWOL.

Of course, deciding whether or not to take discipline is a far different matter from deciding whether an incident is one for which discipline is appropriate. At this juncture, the manager must carefully assess the real significance of the offense in terms of its probable effect on work-unit performance and on the supervisor's relationship with both the employee and other subordinates. In our hypothetical case, for instance, the supervisor should consider whether the two-hour lunches have caused deadlines to be missed, meetings to be rescheduled, or clients to be dissatisfied. The supervisor should also determine the extent to which the employee, through his or her behavior, has effectively reduced the supervisor's authority or stature in the eyes of the other workers in the office.

In determining whether to excuse behavior that constitutes an offense, a supervisor should take into account the employee's performance record, length of service, the agency's inclination to take or not take disciplinary action in similar cases in the past, and the validity of the reasons or explanations the employee gives for his conduct. Perhaps the employee took the two-hour lunches to attend farewell or retirement luncheons, not realizing that supervisory permission was needed to do so. Such circumstances would tend to mitigate the seriousness of the offense. On the other hand, stronger action would be in order if the employee had taken two-hour breaks to go shopping.

As a general rule, informal measures are prefera-

that a recurrence will draw formal action. In some cases, the employee may have a personal problem that is causing the difficulty, and a simple one-on-one discussion or consultation can help bring about a solution.

Nevertheless, the supervisor should document each instance in which an employee is informally counseled for improper conduct. This strengthens management's position, in the event that formal discipline is taken, by demonstrating that the action was the result of a deliberative process. When confronted with isolated instances of unexcused absence, a supervisor can sometimes defuse the matter by having the subordinate agree to take annual

Deciding whether or not to take discipline is a far different matter from deciding whether an incident is one for which discipline is appropriate.

leave for the time missed. In most cases, the imposition of formal discipline should be a last resort, taken only after informal, common-sense measures have failed.

Usually, the agency regulation that sets forth offenses also "suggests" penalties. But these suggestions are just that, guidelines, not an official, prescriptive framework within which minimum or maximum penalties must be imposed. In determining an appropriate penalty, the supervisor should weigh the same factors considered in deciding whether to take disciplinary action in the first place. The penalty should reflect a balance between the magnitude of the offense and the extenuating factors applicable to the case.

These latter may include the employee's history of good conduct and performance, unusual circumstances surrounding the commission of the act, and ambiguities or inconsistencies in applicable policy. Although actual offenses may be the same, the context in which they are committed seldom is. Consequently, the "appropriate" penalty is not often easily

scientific deliberation.

Civil service case-law precedent is also available to guide supervisors in selecting a penalty. Of particular value are precedents established by the Merit Systems Protection Board. That three-member, quasi-judicial administrative forum has the authority to review cases involving severe disciplinary actions—suspensions of more than 14 days or removal.

In the 1981 landmark case *Douglas V. Veterans Administration*, the board established 12 criteria or factors it uses in determining whether a penalty is appropriate. These so-called "Douglas factors" include:

- The nature of the relationship between the offense and the subordinate's performance of duty. (For example, the degree of penalty considered appropriate for an offense committed during the exercise of job duties may be inappropriate for an incident which occurred during off-duty hours.)
- The employee's disciplinary record, performance record, and length of service.
- The employee's job level and type of employment, including supervisory or fiduciary role.
- The effect of the offense on the employee's ability to perform satisfactorily in the future and on the supervisor's confidence in the employee's ability to do so.
- The effectiveness of alternative sanctions.
- The extent to which the employee knew that his behavior was wrong. For instance, had the supervisor or unit informed employees about official policy on lunch periods?
- The consistency of the penalty with those imposed by the agency for the same or similar offenses.

Systematic application of these factors in fact closely parallels the deliberative process outlined above; used judiciously, it constitutes a logical, common-sense approach to questions involving disciplinary action. By documenting the steps taken, management should be able to show that its decision-making procedures were fair. Such a record should also serve to establish that the discipline is

Reducing grades of the general schedule work force

Congressional Budget Office, Washington, D.C., September 1984

During the past 10 years, the federal job classification system has been the subject of several critical reviews. In general, the verdict has been that this system, under which the pay grades for some 1.4 million white-collar employees are determined, is expensive, complicated, rigid, and not well administered. The most recent of these reviews, the President's Private Sector Survey on Cost Control, better known as the Grace Commission, highlighted two classification problems having especially significant cost implications. One is the disproportionate number of high-graded federal positions, and the other is the large number of incorrectly graded positions. The several methods proposed for resolving the grading and classification problem vary in severity and potential for cost reduction. Recently, the Congressional Budget Office examined several aspects of the grade-and-pay issue as well as options for remedying position misclassification.

According to the report CBO issued, critics of the current classification system contend that federal pay grades are too high. They point to figures showing that from March 1974 through March 1983, the average grade for full-time General Schedule workers increased nearly one-half grade, from 8.03 to 8.51, and that the proportion of middle-management grades (GS-11 through GS-15) grew from 33 percent of the work force to 37 percent. As a result, pay levels for federal employees are roughly 4 percent higher than in 1974, an increase the Congressional Budget Office estimates adds \$1.3 billion to annual payroll costs.

The CBO study team cites numerous factors for the grade escalation, attributing roughly two-thirds of the rise to growth in the proportion of nonclerical jobs. Also seen as significant drivers are the increase in and frequency of

veals that even if grade escalation were largely attributable to an increase in promotions, its unfavorable budgetary impact has been far smaller than the favorable budgetary impact of the pay caps.

Critics have alleged that comparison of the federal grade and pay structure with that of industry suggests that the federal government has a disproportionate share of high-grade positions. Of jobs in the career fields examined by CBO, one-fourth were at the GS-13 or above level, whereas only one-tenth of comparable positions in the private sector enjoyed such stature. Similarly, while 43 percent of the federal jobs were found to be graded at GS-9 or below, 61 percent of comparable private-sector jobs were.

Further analysis, however, reveals that although the federal structure includes more positions at the middle and upper-management tiers, private-sector workers in comparable positions actually earned larger salaries for essentially the same work and level of responsibility. Using figures from a Bureau of Labor Statistics survey, the study team concluded that on average, federal salaries may be about 20 percent lower than those earned in the private sector for the same work.

The CBO report goes on to discuss an administration proposal to reduce the number of GS-11 through GS-15 positions by downgrading about 40,000, or 8 percent of all such jobs. The reduction would be accomplished through normal attrition over a four-year period. This plan would not reduce the size of the work force, but would lower average grade by about one-tenth of a grade for five-year savings of approximately \$3.9 billion. The Grace Commission has recommended an average reduction of one-half grade, but the CBO analysts regard that proposal as unrealistic, given that the rise in grades over the past decade is largely due to the government's need for more highly skilled workers. One major advantage of the administration's plan is that the necessary restructuring could be accomplished within the context of existing compensation and personnel management practices.

Frequent departures from pay comparability with the private sector also appear to have contributed to the high-grade phenomenon, according to the report. The authors suggest that Congress could remedy this situation by requiring the administration to phase in full pay comparability. Gradual implementation would give officials time to refine existing comparability measures and restructure jobs without resorting to personnel layoffs. However, estimates indicate that a pay comparability ad-

Proponents of this plan, the report states, believe that comparability with the private sector is a fair and sound basis for adjusting federal pay and point out that the mechanisms for implementing the approach are already in place. Opponents maintain that pay comparability cannot be measured til-for-tat and that the plan is likely to leave the federal grade structure still relatively top-heavy, at least for the near term.

A second alternative to the administration's proposal calls for basic reform of federal personnel management practices. Testing of a system that incorporates such broad changes is currently under way at four Navy laboratories. Features of the demonstration project include simplified classification procedures and performance-based pay adjustments. Preliminary findings indicate that the approach has enhanced personnel recruitment and retention, but not without cost.

Thus average starting salaries for newly recruited engineers and scientists at the participating laboratories have been roughly 9 percent higher than they would have been under the current system. The increase appears to be attributable to the expanded flexibility the system affords managers in setting salaries. Although CBO analysts acknowledge that it is too early to predict the impact of government-wide adoption of such a system, they estimate that a 9-percent pay hike for engineers, scientists, statisticians, and medical professionals could increase the federal payroll by as much as \$200 million over five years.

Advocates of the approach being tested point to the benefits already realized by the labs. For example, they believe that improved recruitment and retention at those facilities will relieve some of the pressure on managers who, constrained by pay caps, have rewarded subordinates by upping their grades. Detractors claim that sweeping reforms will prove costly and difficult to implement and note that broadened managerial flexibility in setting pay is likely to invite morale and administrative problems similar to those experienced with the Senior Executive Service.

Finally, citing a work force analysis conducted by the Office of Personnel Management, the report notes that more than 200,000 federal jobs appear to be incorrectly graded—about 185,000 jobs (14 percent) overgraded and 20,000 (1.5 percent) undergraded. CBO estimates that incorrect grading accounted for \$650 million in government payroll costs in FY 1983.

penses, if necessary. The legislature also could modify statutes that protect the pay of downgraded workers and thus limit the savings that could be realized by correcting overgrading. The CBO study specifically addresses three options for congressionally mandated remedial action.

Mandate regrading under current statutes. Should Congress mandate regrading but leave the protection statutes as they are, federal payroll costs through FY 1989 would decrease by \$50 million. Actually, outlays would increase during FY 1986 and 1987 because costs associated with grade correction would occur immediately but savings would not be realized for two years. Supporters of the two-year grade- and pay-retention policy maintain that it cushions the impact of downgrading and thus reduces a manager's reluctance to take corrective action. Opponents assert that the government should be able to achieve savings available without delay and that postponement of downward salary adjustments undermines the budgetary incentives associated with the corrective action.

Mandate regrading and start half-pay raises immediately. Under this option, downgraded workers whose salaries are higher than the top step of the correct grade would receive only one-half of the annual government-wide pay adjustment. Now, those employees continue to receive the full pay adjustment for two years following the downgrade. Proponents argue that this alternative offers sufficient protection to downgraded workers and at the same time generates five-year savings of \$480 million.

Mandate regrading and severely modify grade- and pay-retention statutes. This proposal would require downgraded individuals to remain at the step they had attained before being regraded; they could not move to the step closest to their salary prior to downgrading. Although employees affected would retain their current salaries, they would be denied government-wide pay increases until the General Schedule salary for their new grade and step caught up with the salary they earned at the time downgrading occurred. Advocates claim that the approach both achieves correct grading and maintains the practice of basing step increases on length of federal service. Projected savings through FY 1989 would amount to some \$875 million.

Conducted at the request of the Chairman of the Senate Appropriations Subcommittee on Treasury, Postal Service, and General Government, this study refines and expands upon the contents of two February 1984 CBO

Reserves net gains in manpower, material

For the first time since 1961, the strength of the U.S. Selected Reserve has risen above one million. Secretary Weinberger made the announcement late last summer in Knoxville, Tennessee.

In commenting on the posture of the reserve forces, the secretary noted that reserve strength is increasing as reserve units continue to receive infusions of modern equipment. He pointed out that the F-15 aircraft is scheduled to be delivered in 1985 to the Louisiana Air National Guard, the first such unit to be equipped with the sophisticated fighter. He also cited the recent delivery of the new M1 Abrams tank and added that under the current modernization program, many more reserve units around the country can look forward to receiving state-of-the-art equipment. (*Jane's Defence Weekly*: August 18, 1984)

AF signs multiyear contract for engines

The Air Force has signed a multiyear, \$1.58 billion contract with General Electric's Aircraft En-

bomber. The agreement marks the first time that the service has used a multiyear contract for the acquisition of aircraft engines.

By choosing the multiyear approach over a series of annual procurements, the service expects to realize cost savings of \$210 million.

The contract includes a production schedule that calls for 43 engines in 1985, 198 in 1986, and the remaining 187 in 1987. It also requires warranty provisions and sets a timetable for the contractor's expansion of production facilities.

According to the Air Force, the F101 engine has undergone more testing than any production engine ever delivered to it. The accelerated-mission test cycles during the full-

scale development phase were equivalent to 3,000 hours of flight time, or roughly 10 years' worth of service on the B-1B aircraft. (*USAF Aeronautical Systems Division news release*: August 10, 1984)

Experimental aircraft ready for testing

Following a three-and-a-half-year design and fabrication effort, Grumman Aerospace Corporation has unveiled its X-29 Advanced Technology Demonstrator aircraft, the first X-series aircraft in more than a decade.

The X-29 incorporates a number of advanced design features, including a distinctive forward-swept wing made of a graphite-boron epoxy composite. These and other high-tech features are designed to

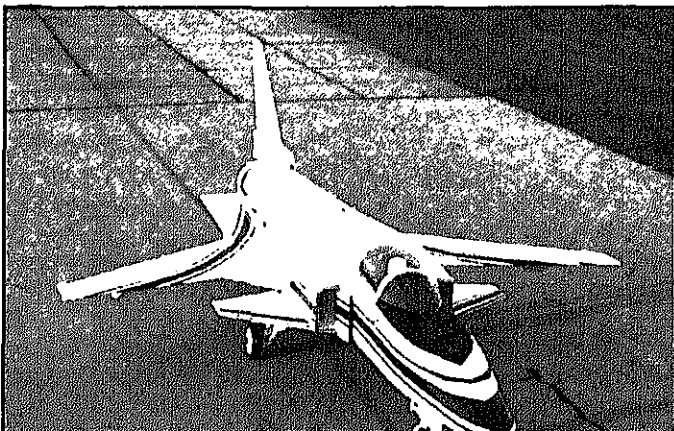
achieve improved agility, a higher angle-of-attack capability, and greater aerodynamic efficiency.

An 18-month concept demonstration flight phase is scheduled to begin in November 1984 at Edwards Air Force Base, California. Participating in the test program will be the National Aeronautics and Space Administration, the Air Force, the Navy, and Grumman. Test results are expected to validate innovative design approaches and configurational options that will satisfy future mission requirements. (*USAF Aeronautical Systems Division news release*: August 27, 1984; *OASD (PA) news release*: August 27, 1984)

Trial program spurs local innovations

As part of an ongoing effort to improve working and living conditions at military installations, DoD has implemented the Model Installation Program at 15 sites, chosen from among all the services.

Under the three-year trial program, local commanders will be permitted to experiment with management approaches and operational methods that are not prescribed by regulations and policy. Any



Architects of the program expect it to spotlight better ways to operate bases, expose counterproductive or wasteful regulations, and improve morale, performance, and retention among personnel.

The installations participating in the program are: (Army) Aberdeen Proving Ground, Maryland; Anniston Army Depot, Alabama; Fort Polk, Louisiana; Fort Sill, Oklahoma; U.S. Army Support Command, Hawaii; (Air Force) Hickam AFB, Hawaii; Kirtland AFB, New Mexico; Moody AFB, Georgia; Reese AFB, Texas; Whiteman AFB, Missouri; (Navy) Alameda NAS, California; Meridian NAS, Mississippi; Great Lakes Naval Training Center, Illinois; (Marine Corps) El Toro Air Station, California; and Albany Logistics Base, Georgia. (OASD (PA) news release: June 26, 1984)

New group promotes equity for women

Secretary of Defense Caspar W. Weinberger has directed the establishment of a DoD Task Force on Equity for Women. Chaired by Dr. Lawrence J. Korb, Assistant Secretary of Defense (Manpower, Installations and Logistics), the body will evaluate the effect of defense policies,

Defense Department. It also will analyze the potential impact of proposed or pending legislation on equitable opportunities for DoD women and ensure that material written by or for the department is free of gender-biased phraseology.

The number of women associated with DoD totals more than 1.5 million, comprising 195,000 military personnel, 340,000 civilian employees, and roughly one million civilian spouses of military personnel. (OASD (PA) news release: August 24, 1984)

C-17 cargo system put through paces

The Air Force, Army, and Marine Corps recently teamed up with McDonnell Douglas Corporation to evaluate the cargo system of the Air Force C-17 transport aircraft. Using a full-scale cargo compartment mock-up, engineers and service officials measured the efficiency and speed with which combat vehicles could be loaded onto and off-loaded from the aircraft.

Of particular concern to the evaluation team was the configurational compatibility between the combat vehicles, palletized cargo, and the fuselage design. Combat vehicles used in the test included

helicopter.

The 10-day evaluation took place at the corporation's facility in Long Beach, California. (USAF Aeronautical Systems Division news release: September 25, 1984)

Services line up for fast food

The Navy Resale and Services Support Office has awarded McDonald's, the fast-food chain, a 10-year contract that allows the company to open as many as 300 restaurants on Navy bases around the world. The contract award comes several months after the Army and Air Force awarded a similar contract to Burger King.

While commercial fast-food restaurants have operated on some military installations for several years, they have done so under auspices granted by the local base. These recent contracts mark the first time that the right has been awarded on a service-wide basis. (Newsweek: August 27, 1984)

OPM unvels plan to battle bulge

The U.S. Office of Personnel Management has issued a Federal Personnel Manual bulletin designed to trim the "bulge"

outlines a plan to reduce the number of personnel in grades 11 through 15 by 2 percent over each of the next four years. According to OPM, the initiative will save \$1.7 billion.

Reductions will be achieved through normal attrition, which annually is 6.5 percent for employees in these grades. The proportion of the federal work force in these grades has doubled since 1960, according to Donald J. Devine, director of OPM. (OPM news release: July 23, 1984)

Correct number a phone call away

Anyone from outside the Washington, D.C., area who has ever tried to track down the duty phone number of one of the roughly 25,000 people employed at the Pentagon knows what a difficult and frustrating exercise that can be. But all that is history now, thanks to the installation of a computerized directory assistance system that enables the operator to find the correct number even if the caller does not know the party's first name or office code.

Lockheed Electronics Company installed the system as part of an eight-year, \$1 million contract. The system contains about 150,000 listings. The num-

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